Poverty reduction through energy projects

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Executive summary

Energy in itself may not be a basic human need, but it is needed for meeting all the basic needs- food, shelter, health, education etc. As a sector, energy development has both direct and indirect implications on urban and rural poverty. Improving access to and broadening the choice of energy sources of the poor affect their state of welfare in several positive ways. These direct and positive benefits of improved energy services can be in the context of employment and income generation opportunities resulting from providing modern forms of energy, besides a better quality of life.

Poverty being the focus of the international agenda, the Asian Development Bank has also adopted "poverty reduction" as its overarching aim. With its commitment towards poverty reduction, the strategy adopted by ADB promises to target the issue of poverty either directly or indirectly.

There are various dimensions of poverty- the income and the non- income dimensions, and they have a bearing on growth and development. There is a need to highlight the importance of breaking the vicious circle of poverty and the adverse environmental effects of development, which hamper sustainable growth, including for the poor. Besides increase in income, improving the quality of life of the poor is also essential to break this circle. Providing energy services to the poor is a welfare enhancing activity, as it leads to better quality of life and also improves the economic condition of the poor. The concept of energy ladder further illustrates that all policies in this sector should encourage a movement upwards in the ladder- from rung one (where the traditional fuels are used) to the final rung, where more efficient energy is used, and the end consumption of energy is not only for meeting the basic needs- like food, shelter, but improving quality of life- like energy used for communication, knowledge and entertainment. Further, the increasing population pressure and the simultaneous shrinking resource base indicates that for sustainable growth appropriate policies have to be put in place that reduce these pressures. Use of traditional fuels like firewood creates pressure on the forest, and if efficient energy technologies are put in place, these pressures will be reduced. Therefore promoting efficient energy sector development is one way to achieve sustainable growth.

The vicious circle of poverty is generally characterised by low productivity, low per capita income, low literacy rate and high population density. These would in turn discourage the poor people to adopt soil conservation methods,

use better irrigation methods, better and more energy efficient utilisation trend, etc. On the other hand, the vicious circle of development and environmental degradation can be characterised by the failure of institutions that promote efficient utilisation of natural resources and better environmental management. Both these vicious circles disproportionately cost more to the poor. For example, even though crop declines associated with human induced climate changes are expected to be small, the negative yields are primarily found in the low latitudes, where the developing countries are situated. Sea level change for example, would hit hardest on agriculture societies in coastal plains - where majority of the poor live. In other words, it is normally the poor who pay most for the externalised non market social costs of environmental degradation, and this is because of the fact that they are marginalised in the decision making as well.

Based on the four dimensions of poverty (income, capabilities, security and empowerment) the following energy development goals/policy interventions were identified.

- Expand access to modern energy systems
- Improve the energy supply reliability
- Improve governance and regulation
- Reduce health and environmental costs
- Ensure fiscal sustainability

Rural inequity and poverty have their roots in the conditions of landless, subsistence agriculture, and age old class structure. This is also true in the case of energy sector development. The non-poor industrial, commercial and transport sectors are organised and capable of evaluating and negotiating their energy needs with the energy supply agencies and planners. This is not the case with the poor and disadvantage section of the society. Moreover, besides the increasing burden of poverty, deteriorating environmental conditions affect the poor adversely. For example, the increasing dependence on fuelwood for cooking has led to deforestation problems. It is now widely accepted that technologies based on the use of renewable energy resources have a high potential in improving the economic conditions of the poorer sectors (particularly the rural poor) in the developing countries. Enhancement of renewable energy sources is a must to meet the projected energy requirements, owing to the non-availability of traditional resources (eg. fossil fuels) and environmental reasons.

ADB's poverty reduction strategy

All ADB sector loans are now expected to contribute to the overarching objective of poverty reduction through three key pillars of (a) pro-poor sustainable growth (b) social development, (c) governance.

Existing methodologies for measuring poverty impact

The Bank uses two methods to measure (ex-ante) the impact of any project on poverty reduction- distributional analysis and the poverty impact ratio. ADB's guidelines for the Economic and the Financial Analysis of projects (Appendix 25) outlines in detail the procedure for calculation of the distributional analysis. The difference between economic value and the projects financial value is distributed among various stakeholders. Appendix 26 of the Bank's "Economic and Financial Analysis of projects" explains the methodology of calculation of the poverty impact ratio. The proposed Handbook for Poverty Impact Analysis of Projects of August 2000 clearly stipulates disaggregating of winners and losers arrived through the distribution analysis of the projects into poor and non-poor categories. Thus, it primarily relies on income based definition of poverty.

The distributional analysis would show widely different incidence of project impacts for different discount rates, and there is no precise answer about which is the correct discount rate. Calculations based on different discount rates should be carried out for examining the sensitivity of poverty impact to discount rate variations. Using the PIR as an index to measure the impact on poverty is an incomplete exercise in itself. It also does not account for the innumerable indirect benefits of providing energy services for the poor. Government normally tend to direct a portion of welfare gains to the poorest sector. But there is no exact formula for arriving at the proportion of the welfare gains, which would in all probability go to the poor. It may therefore be appropriate to use the proportion of resources being used for poverty alleviation in a country's annual budget as an indicator of poor's income share of welfare.

Alternative techniques suggested for measuring poverty reduction

Objective tree and cause and effect analysis

All energy projects should, at the start of the project operation cycle prepare an objective tree detailing out the primary and secondary objectives of the project and how the project will address the issue of poverty reduction. To construct a rational and more realistic objective tree, cause-effect analysis should also be carried out. The cause-effect analysis should be able to identify the major cause of poverty in the area and how development of energy sector fits in as one of the solutions, and should be able to establish clearly the links between energy and poverty reduction so as to enable a pro- poor designing of the project. A participatory study to assess the links between poverty and energy in the area should be made mandatory during the high-level forum stage of the project operational cycle.

Benchmarking projects for ensuring poverty reduction

In order to evaluate the portfolio of ADB energy projects document through reports and through recommendations of the president (RRPs), from the poverty alleviation perspective, certain benchmarks or criteria could be used to assess whether the project has been effectively designed to cater to poverty reduction objectives. Listed below is a set of criteria against which all projects should be assessed. This exercise would help identify the weaknesses and shortcoming in the project design and refine it so as to suit the objective of poverty reduction.

Benchmarking criteria

1. Has the project prepared an objective tree and a cause and effect analysis (to draw on the evidence and address the causes of poverty)?
2. Has the project addressed the issue of poverty alleviation in the selection and design of project site?
3. Has a participatory assessment exercise been carried out in the project area?
4. Is the project linked to poverty focused policy reforms and institution building?
5. Has it been ensured in the project design that the project will not have any negative impact on the poor?
6. Does project background data establish the extent to which the situation of the poor and the target group in particular can be assessed?
7. Has a poverty impact assessment exercise been carried out for the project?

Macro level poverty impact (value addition by the energy sector)

Most of the energy sector projects funded by the ADB can be strictly classified as feeding into direct economic growth or environmental protection and sometimes because of the very nature of the project scope, it is difficult to estimate the exact impact on the poor. Economic development has immense positive impact on poverty reduction. However as much of the impacts is indirect and sometimes non- monetary in nature, accounting for the benefits, particularly the impact on the poor, is difficult.

The major end users of energy are the residential, agricultural and industrial sectors. For every unit of power consumed by these sectors immense value addition takes place- in the form of employment and income. Majority of the poor households are dependent on the agricultural and industrial sectors for their employment. In India, for example agriculture is the major source of income and employment. Therefore for every unit of power consumed in these sectors, there is subsequent increase in production, thereby leading to employment and income opportunities. Total value addition of a power project can therefore be estimated by using the following equation:

$$V_{tv} = (PCR * V_r) + (PCA * V_a) + (PCI * V_I)$$

Where:

PCR is the percentage share of the residential sector in total power consumption in the area,

PCA is the percentage share of the agriculture sector in total power consumption in the area,

PCI is the percentage share of the industrial sector in total power consumed in the area,

V_r is the value generated by per unit of power consumption in the residential sector,

V_a is the value generated per unit of power consumed in the agricultural sector,

V_i is the value generated per unit power consumed in the industrial sector.

Household level benefits

Consumer surplus defined in the poverty impact analysis framework is an incomplete exercise. The Tajikistan exercise on participatory study on power and poverty supported the view that the provision of electricity will have substantial impact on reduction of poverty, and improve the quality of life in the area. Aside from the high economic costs of using alternative fuel there are time, labor, health, social and gender impacts of the scarcity of electricity. The incremental electricity available in any area will benefit the poor more than the non poor as their consumption is expected to increase faster because of their current low electricity consumption level, and also lower electricity tariffs compared to the alternative energy costs. However, this is a conservative estimate, as most of the indirect effects of the project have not been accounted for in this method. The existing methodology adopted for estimating the consumer surplus (based on the willingness to pay for the next best alternative) takes into account only the direct impact of the project. However, there are many indirect impacts of the project that should be estimated to understand the real impact of the project on the poor. It is recommended that for all those projects where the end consumers are identifiable (for the distribution projects, renewable energy projects, and rural electrification projects) a household level impact analysis (of both the direct and the indirect- saving time and labor, resulting in improvement in health etc) should be carried out. These benefits should be included in the consumer surplus estimation and the final poverty impact ratio should be calculated.

With/without project intervention" analysis

Most of the impacts of the environment projects in the energy sector are indirect, and therefore difficult to estimate. However, poor environmental conditions can be very detrimental for both the health and the economic well being of especially the poor, as they are more vulnerable to risks. Information (even qualitative) on the following can be collected; a with/without analysis would enable understanding the impact of the project on the poor.

- The linkage between the problem and the poor
- The negative impact of the existing environmental problem on the poor (Can be in terms of health impacts, costs incurred thereby, loss in productivity etc.)
- A matrix indicating the positive impact of the project can then be made summarising the above information

Framework for programme loans

The ADB loan classification system Staff Instructions of October 2000 stipulate that the program loan has to conform to these guidelines, thus implying that a program loan can be of PI category or other than PI category. Under the ADB Staff Instructions (SI) of 30 March 1995, guidelines were issued on how to assess such program loans for determining their impact on poverty. These include calculation of various dimensions of impact on poor: direct, indirect, macroeconomic, and threshold (the near poor who might be made poor). This analysis is based on the assumption that growth can be used for poverty reduction. The SI does not require that the analysis be based on real data in the concerned sector.

For the programme loans it is suggested that a "with" and "without" analysis should be carried out. In working out the "with and without framework", the analysis should have the following steps: The "without" program scenario should develop certain benchmark poverty reduction indicators, so that these are monitored during the ex ante analysis of "with" the program intervention. The same should also be monitored during the implementation of the program.

Through each of these baseline indicators, one can calculate the impact of the programme intervention. The net impact can be attributed as the ultimate impact of the project. In most of the projects only qualitative analysis is possible. Even a qualitative exercise on the same is a significant indication of the kind of impact on poverty reduction

A table with the list of techniques that could be selectively used as per the project classification type is provided.

Table 1 Poverty reduction strategies

Project type	Objective tree/ cause and effect analysis	Benchmarking exercise	Poverty impact ratio	Macro level impact analysis	Micro level (household level) impact analysis
Generation projects	✓	✓	✓	✓	
Transmission projects	✓	✓	✓	✓	
Distribution projects	✓	✓	✓		✓
Energy- environment project	✓	✓		✓*	✓*
Programme loans	✓	✓		✓*	

**in this case a macro level qualitative analysis with and without scenario can be undertaken.*

Benefit Monitoring

In-spite of the increasing nature of investments in the energy sector, there is hardly any measurement of the impact of these services, making it difficult to understand the impact of these interventions. To validate the ex-ante impact analysis done before the project, the system of ex -post analysis would also have to be initiated. The Bank's guidelines on benefit monitoring and evaluation, 1992, provide guidance about the Bank's policies about benefit monitoring. Information on crucial indicators should be collected at regular regular intervals during the project time and after the project is over.

Project cycle interventions

Based on the discussions in the earlier sections, the suggested methodologies/analysis should be carried out. At the identification stage of the project cycle, a participatory study (among beneficiaries) should be conducted as it will make the objective tree and cause and effect analysis more realistic. The Benchmarking exercise should be carried out after the preliminary concept note has been prepared. While at the appraisal stage, both the macro level and the micro level analysis should be done. During the project implementation phase, data should be collected and monitored so that a 'with without' analysis can be carried out after the project is over.

Analysis of IEEN Portfolio

Based on the methodologies suggested earlier each of the projects in the IEEN portfolio has to be analysed for orienting them towards poverty reduction. For instance the Shen de System Improvement and Electrification Project has the following objectives included under the Country Assistance Plan (CAP).

- Support sector and enterprises reforms in power sector of Liaoning province
- Augment power transmission capacity and system improvement to support economic development in the province.
- Expansion of electricity in rural areas.
- Improvement of environment through closure of old and inefficient thermal plants

And, the project components included under the CAP are:

- Establishing additional 500 kV transmission facilities
- Providing related 110 kV and 220 kV transmission facilities
- Modernising the old dispatch and communication system
- Connecting to rural households in Liaoning (Liaoning is a Northeast province with nine counties having about 3 percent population with income less than RMB 500 in 1993)
- Closing down inefficient and polluting power plants.

Thus, based on the methodology discussed, the suggested poverty reduction objectives and scope of the project should include:

Poverty reduction objectives

- Increase access to modern energy
- Increase reliable supply of energy
- Mitigate health and environmental costs
- Improve governance and regulation
- Ensure fiscal sustainability

Suggested project scope and design element

- Establishing additional 500 KV transmission facilities, and provide related 110 KV and 220 KV transmission facilities.
- Rehabilitation of the existing distribution system for reducing system losses in the poverty effected counties of Liaoning.
- Close down old, inefficient and polluting power stations.
- Start rural electrification programmes in the rural areas in the poorer counties of Liaoning.
- Improve reliability of power supply in the poorer regions of the provinces through modernising old dispatch and communication systems and system improvement.
- Tariff reform: metering of power supply at the end consumers, affordable power to the poor people (lifeline tariff for minimum use). Easing first cost constraints: provide consumer credit and connection subsidies, micro finance.
- Community participation in managing power supply. Empowerment of the communities in rural areas.
- Improved governance and regulatory reform, and establish institutional capacity to manage electric supply on sustainable basis.

Methodology suggested for maximising poverty reduction impact

- Objective tree/cause and effect analysis
- Benchmarking exercise
- PIR
- Macro level impact analysis

Poverty reduction is now the overarching goal of the Bank's investment in the region. The IEEN has accordingly taken steps in giving orientation of its portfolio towards the same. An analysis of the IEEN's portfolio shows that there is considerable emphasis on the generation and transmission projects in the Developing Member Countries (DMC): about 33% of the proposed investment during 2001-03 is expected to flow in these kind of projects.

The analysis of the existing ADB guidelines on poverty reduction shows that the major focus of the strategy is on the ex-ante impact analysis stage. Poverty reduction strategy should be a continuous affair. However, the emphasis should be not only on ex-ante but ex-post impact of the project. In this context the importance of benefit monitoring is highlighted. It is therefore suggested that a benefit monitoring exercise based on the parameters developed at the ex-ante stage should be monitored and evaluated at regular intervals both during and after project implementation phase. It may happen that there could be a time lag between the project completion and the visible impact on the poor. In that case the Bank may initiate dialogue with the concerned DMC for appropriate monitoring of the benefits as a part of the poverty reduction strategy in the country. The outcome of such monitoring should be considered while designing the future projects in the concerned DMC.

1

Introduction

Background to the study

In tune with its commitments toward reducing poverty, ADB has financed investments and policy reforms aimed at promoting growth and employment and especially in the 1990s, focussed on human development, gender equity and environmental protection. In addition, ADB has supported projects that directly target the poor (e.g. for basic education, nutrition, health and family planning services), or those which establishe mechanisms to protect vulnerable groups.

Till recently ADB had committed that atleast 50% of its projects and 40% of its lending volume will be devoted to projects with objectives other than economic growth, including poverty reduction. Now the poverty reduction strategy promises that all public sector loans will aim directly or indirectly to reduce poverty and that 40% of ADB's public sector lending will be spent on poverty interventions from 2001 onwards.

One of the sectors in which the ADB has been actively involved is the development of the Energy sector: the first energy policy of ADB (1981) was mainly focussed on overcoming the crisis caused by the oil price shocks and laid considerable emphasis on supply augmentation in the developing member countries (DMCs), while the second energy policy paper (1995), focussed on enabling private investments in the energy sector, demand side management, integrated resource planning, energy efficiency and the local and the national level environmental considerations relating to the sector. The review of the 1995 energy policy of ADB led to the decision of reorienting, modifying and supplementing ADB's approaches in the energy sector towards the important themes of poverty reduction, pro-poor economic growth, social development and good governance and increasing access to energy for the poor.

As a sector, energy development has both direct and indirect implications on urban and rural poverty. These impacts vary depending on the energy activity. Investments in traditional energy projects such as the construction of a power plant lead to direct impacts in terms of employment generation leading to increased incomes, which improves the quality of life through access to services such as health, education and housing. This leads to other economic impacts such as increased productivity and diversification, and social impacts such as time savings, human and social capital development and gender impacts.

In rural areas, there is a primary dependence on biomass and other energy sources at the lower rungs of the energy ladder. Moving to the higher rungs of the energy ladder, such as the use of electricity and gas, is often difficult. The use of low quality fuel creates indoor pollution; this causes health problems particularly among women and children, who spend more time indoors. Consequently, dependence on biomass has adverse environmental and health effects. Biomass and fuelwood collection affects forests and natural resources, as watersheds are degraded and agricultural productivity can be affected leading to lower incomes for those dependent on agriculture. This in turn would increase the need for natural resource extractive practices that further damage the environment. The potential approach to reducing poverty in the rural areas through energy projects is very different. In the rural areas, there is a potential for core-poverty reduction energy activities.

Indirect impacts, which often exceed the direct poverty reduction impacts, are more relevant in the urban sector than in the rural sector. These impacts, though larger in scope, are more difficult to understand in terms of linkages between expanded energy provision and reduced poverty. It can also be noted that the provision of energy will have indirect impacts on poverty reduction via the other sectors that use energy. Investments in the energy sector may have little effects on poverty if these do not have implications on the activities of other sectors such as transport, industry, communications etc. The indirect impacts of energy projects on poverty reduction should consider other issues such as energy production and distribution, employment generation, capital and product markets, energy efficiency and environmental impacts of energy projects. It is in this context, ADB has undertaken a study that will make a contribution to the understanding of the impacts of Infrastructure Energy East division (IEEN) projects in poverty reduction. It felt the need to develop a framework for the design of projects and analyzing ex-ante their poverty reduction potential. Both direct and indirect poverty reduction and potential impacts will be identified and procedures for that will be recommended.

Objectives of the study

The overall objective of this study is to develop a strategy to promote poverty reduction through energy projects sponsored by ADB, and to assess the impact of the ADB funded energy projects (IEENs) on poverty reduction. The specific objectives under this are:

- Establish the link/relationship between energy development and poverty reduction (both at the macro and the micro level).
- Review the existing guidelines, procedure and methodology adopted by the ADB to assess the impact on poverty reduction.
- Develop a detailed evaluation framework to identify and assess the direct and indirect impacts of the energy projects on poverty reduction. The framework will include checklists and guidelines for determining the pro-poor growth, poverty interventions, including the core poverty intervention approaches for energy projects.
- Identify and assess the above impacts (that have direct and indirect impacts on both urban and rural poor) on the basis of the evolved/recommended framework.
- Review the Country Assistance Plans (relevant to IEEN), focussing on the components which will have poverty reduction impacts.
- Suggest alternative and more specific areas (that can have more impact on poverty reductions) on which IEEN projects should concentrate.

Study approach

In order to meet the above objectives, the following methodology was adopted.

- To establish a thorough understanding of the relationship and the links existing between poverty reduction and energy development at the macro level, existing studies, reports and other secondary publications were reviewed.
- The existing ADB approaches of designing poverty reduction projects, the method of impact assessment, guidelines and policy papers were reviewed to understand ADB's approach to poverty reduction.

- A micro level survey among selected project beneficiaries in Philippines was undertaken. A qualitative assessment and a focussed group discussion was held among the project beneficiaries to validate the findings at the macro level.
- Extensive discussion with experts were held both within and outside of ADB

- To ensure that the proposed framework was practical and accepted, the draft framework would be put up for discussion at a seminar/brainstorming session within ADB to elicit comments, which will be incorporated in the final report.

Structure of the report

Following the introductory, the next chapter goes on to discuss the vital nexus existing between energy, poverty and environment. It explains the various dimensions of poverty- the income and non income poverty, the concept of sustainable development- the vicious circle of poverty and environmental degradation, the role of energy services for poverty reduction, the energy ladder and the vital link between energy and environment. Chapter 3 discusses the nature of policy interventions required to attain the energy goals of poverty reduction. Chapter 4 explains the existing methodology adopted by the Asian Development Bank to measure the impact on poverty reduction, and the lacunae or the shortcoming of the existing methodologies are then pointed out. Finally alternate methodologies are suggested to study the impact on poverty reduction. The final chapter analyses all the major energy projects of ADB pipelined for 2001-03, and for each of these projects suggests refinements based on the alternative methodologies discussed in chapter 4.

2

Energy, environment and poverty nexus

The relationship between energy and economic development is as crucial in the Less Developing Countries (LDC) as it was and continues to be in the industrial nations. The process of economic growth is traceable in large parts to the substitution of energy for muscle for every type of agricultural, domestic and industrial task. It is hardly surprising then that prospects for growth in critical sectors in the economy are linked at least in part to exploration, development and use of energy sources available.

The successive oil price increase since 1973-74 has made it increasingly clear that both availability and price of petroleum products can be key determinants of economic growth and social welfare. Therefore, there is in evidence a steady all round effort to lessen the dependence on crude oil through promotion of alternate and other conventional sources of energy supply such as coal, nuclear, solar, hydrothermal, and biomass.

Decreasing energy use through conservation is the natural helpmate to raising energy supply. Along with the aim to replace oil and gas with abundant domestic fuels in industrial and electric utilities and to reduce energy demand through improved efficiency, energy technologies are changing based on long-term research and development programmes. The goal is to provide technology and products for a virtually inexhaustible energy supply. Technologies are being developed to serve specific purposes and to compete in the commercial market. The principal factors in achieving this objective are not strictly technological, but social, economic, environmental and legal as well.

The energy crisis of 1973 managed to attract the attention of the public and the policy makers towards the shortage of commercial energy. Gradually however it dawned upon the policy makers that the position regarding traditional sources of energy is also not very comfortable and that in fact this is one of the major day to day problem of the rural people who form the major portion of the world's population. In the developing countries, the dependence on the traditional fuels is subsistence in nature, the poor households depend upon fuelwood, agriculture waste and animal waste as their main source of fuel. The trend in the developing countries showed that the domestic sector comprised more than 75% of total energy consumption coupled with the dwindling forest cover and the innumerable environmental problems that follows. Policy makers were forced to think on the important linkages between energy and poverty reduction. It was realised that developing the energy sector would have its implications on poverty reduction.

This chapter explains the concept of poverty and its changing dimensions, and illustrates the important nexus existing between energy poverty and environment, and poverty.

Poverty: many dimensions

"Poverty has many dimensions," as the Human Development Report, 1997 states. While traditionally poverty has been measured in terms of income, since 1990 there is an increasing focus on redefining poverty from the human development perspective[1]. This approach has been adopted in recognition of the fact that the income poverty measure conceals complex realities of the diverse livelihood strategies adopted by the poor. It is, therefore, important to look at not just incomes realized but also at the bundles of assets or endowments held by the poor. This would also include the relationship of the people to the resources they have and the commodities they require in order to meet basic sustenance requirements (Chambers 1997, Sen 1981)[2].

In a summary of study from 23 countries participating in a world bank study- "voices of the poor"- poverty is defined as material lack, bad social relations, insecurity and vulnerability, low self-esteem and powerlessness. Therefore, poverty can be characterised into four different dimensions:

- Material deprivation- deprivation of basic needs (measured by an appropriate concept of income or consumption).
- Poor quality of life (low achievements in health and education)
- Vulnerability or exposure to risk (vulnerable to adverse shocks, linked with the inability to cope with them)

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[1] This incorporates the income perspective, the basic needs perspective, and the capability perspective of poverty. The income perspective defines poverty in terms of income poverty lines, the basic needs perspective defines poverty in terms of deprivation of material requirements for fulfilling basic needs of food, health, education, essential services, as well as employment and participation. The capability perspective supports the view that poverty is also a function of a denial of real opportunity to lead "valuable and valued lives " This concept recognizes that poverty is not only a matter of having a few assets but also of constraints that limit the effectiveness with which those assets are used.

[2] Carter and May (1999) use this approach in their study of rural South Africa, where they look at the range of livelihood tactics available to the people and then look at who the poor are by desegregating the rural population into discrete livelihood strategy classes

- Sense of voicelessness and powerlessness in the institution of state and civil society

These various dimensions of poverty are inter-related, each of these dimensions of poverty interacts and reinforces the other in important ways: for example improving the health conditions enhances the earning capacity, thereby leading to increased income. To understand the various determinants of poverty in all its dimensions, it helps to think in terms of people's assets, the productivity or the return to these assets, and the volatility of returns. As per World Bank classification, it can be divided into the following assets.

- Human assets, such as the capacity for basic labour, skills and good health
- Natural assets, such as land
- Physical assets, such as access to infrastructure
- Financial assets, such as saving and access to credit
- Social assets, such as network of contracts and reciprocal obligations that can be called on in time of need and political influence over resources

The return to these assets depends not only on the market conditions but also on the performance of the state and civil society in general. Moreover as the poor people are more vulnerable to the risks and exposure, the role of state and the society has to be geared up so as to reduce or mitigate the impacts of any kind of shocks- internal or external.

Economic growth and income poverty

Growth in the 1980's and the 1990's has been a powerful force for reducing income poverty in the world. In the vast majority of cases, growth has led to rising consumption and income earning capacity of the poorest fifth of the world. The onset of modern economic development led to significant increase in the living standards of the poor people. The last two centuries saw increased income in the rich countries of Europe by more than tenfold, China by more than fourfold and South Asia by more than threefold. The unequal distribution of growth has led to alarming consequences- in the rich countries of Europe the fraction of the population living on less than 1 dollar a day (World Bank has estimated Dollar 1/day as the poverty line) is nil. In China where the growth has been very slow, less than 20% of the population now lives below the poverty line of one dollar a day. In South Asia where growth is all the more less, more than 40% of the population live below the poverty line. Today close to one fifth of the world's people survive on less than $1 a day. As per the estimates of World

Bank (2000), for every additional percentage increase in growth in household consumption, poverty is reduced by 2%. This relationship highlights the importance of economic growth for improving the incomes of poor people and for moving out of the poverty trap[3]. Box 2.1 illustrates that where growth has occurred, it has been an important source of poverty reduction and where it has not, it has stagnated.

Economic growth and non income poverty

The non- income dimension of poverty is now being considered as important as the issue of income poverty. Just as income poverty declines as average incomes increase, so does non- income poverty such as health and education or in other words - quality of life.

The relationship between non- income poverty and economic growth has been established by studies which report that better education, infrastructure and health facilities contribute to faster economic growth. Richer countries and richer people have lower rates of mortality and malnutrition. There is ample evidence that the relationship between economic growth and human development (better quality of life) is strongly correlated. These reinforcing effects from human development to economic development and back (i.e. from economic development to human development) suggest the possibility of a vicious and virtuous cycle. Poor countries and poor people can be locked in a vicious circle, as low human development diminishes economic opportunities, making it more difficult to invest in health and education.

However, increasing the income or the non- income capacity of the people is not enough to ensure a movement towards poverty reduction. The role of state and the civil society, the availability of infrastructure for development and a capacity or skill formation of the poorer section of the society, are sine qua non for achieving the poverty elimination objective.

Growth without direction and purpose is often unsustainable. To evolve a strategy for poverty reduction requires proper understanding of the social economic and political circumstances surrounding the poor. As has been explained earlier, as the poor are more vulnerable and voiceless, the degree of impact of any kind of externalities - social, economic or political, will have more ramifications on them than on the richer section of the society. Therefore, poverty reduction can no longer be viewed as a side effect of development.

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[3] Refer to Growth is good for the poor, By David Dollar et al., World Bank, 2000 for more information on how growth impacts the poor

Growth has to go hand in hand with equitable distribution of economic gains and must be accessible to all. The poverty reduction strategies should, therefore, include varied development objectives like promotion of economic growth, reduction of poverty, improvement of the status of women, progress in population planning and promotion of sound management of natural resources and the environment.

Sustainable economic growth and the role of environment

The processes of development are primarily resource driven. Even technological and institutional changes are triggered by human resources: people are the prime movers in processes that utilise both the renewable and the non-renewable resources. However, resource utilisation strategies differ from country to country. The measure of how effectively and efficiently a society utilises its natural resources typically is reflected in how well that society manages and sustains its resources such that the development processes are not impeded due to resource depletion and degradation (K F Jalal, 1993).

While the basic concerns among countries still focus on economic growth and the general uplifting of living standards, there is the rising concern that this goal cannot be reached if corresponding attention is not paid to examining and providing remedial and preventive measures to avoid worsening environmental condition.

In addition to the policy, institutional and geographic factors, it is important whether or not growth is accompanied by environmental degradation, which can in turn undermine growth. This holistic approach ties in with the concept of sustainability. Kuhn (1998) defines sustainability as "means to sustain ability," referring to the ability of the environment to regenerate as well as "the ability of the people to retain control over their living conditions." These twin objectives are, in fact, the key to poverty alleviation in developing countries since the poor are most vulnerable to environmental degradation and pollution, on account of their direct dependence on natural resources for their sustenance.

In most of the developing countries, the majority of the poor live in rural areas, deriving sustenance from dependence on land, forests, common land, and various communal sources for fuelwood, fodder and water. Firewood, for instance, is the single most important source of domestic fuel providing over 65% of domestic energy in the hills and deserts of north India with much of this gathered from forests and common land (Agarwal 1995). The burden of collection activities tends to fall on women and children, especially girls. The tasks are very time consuming often at the cost of education for children or time away from productive activities in case of adults, be it tending to children or income earning activities. Women also complain of heavy head-loads, which are often the cause for neck or back problems, not to mention the harsh terrain in many areas with the accompanying complaints of cuts or even snake bites.

The dependence of the poor on resources in the absence of alternatives could significantly contribute to resource degradation which further weakens the support base of the poor, perpetuate poverty and result in a poor quality of life. Data for several developing countries indicate that a map of absolute poverty coincides with areas of environmental degradation (UNEP 1995). Thus, while it is essential to undertake interventions to attack poverty directly, such as through employment generation programmes, it is imperative to understand the complex livelihoods of the poor, and the dynamic relation between growth and poverty, in order to ensure that the interventions lead to sustainable growth.

The Brundtland Commission defined sustainable development as a process in which the exploitation of resources, the direction of investment, and the orientation of technological development and institutional changes meet the needs of the present generation without compromising the ability of future generations. Sustainable development can be viewed as having two important interlinkages- poverty and the environmental degradation. Therefore, to tackle one the other cannot be ignored. Figure 2.1 below illustrates the intricate relationship between sustainable development, poverty and environment.

Figure 2.1 also illustrates that to promote sustainable development it is essential to break the two vicious circle - one of poverty- environment and the other of development - environment. Both are linked to environmental degradation due to different patterns of resource utilisation. The vicious circle of poverty is generally characterised by low productivity, low per capita income, low literacy rate and high population density. These would in turn discourage the poor people to adopt soil conservation methods, use better irrigation methods, better and more energy efficient utilisation trend, etc. On the other hand, the vicious circle of development and environmental degradation can be characterised by the failure of institutions that promote efficient utilisation of natural resources and better environmental management. Both these vicious circles disproportionately cost more to the poor. For example even though crop declines associated with human induced climate changes are expected to be small, the negative yields are primarily found in the low latitude countries where the developing countries are situated. Sea level change for example, would hit hardest on agriculture societies in coastal plains - where majority of the poor live[4]. In other words, it is normally the poor who pay most of the externalised non market social costs of environmental degradation, and this is because of the fact that they are marginalised in the decision making as well.

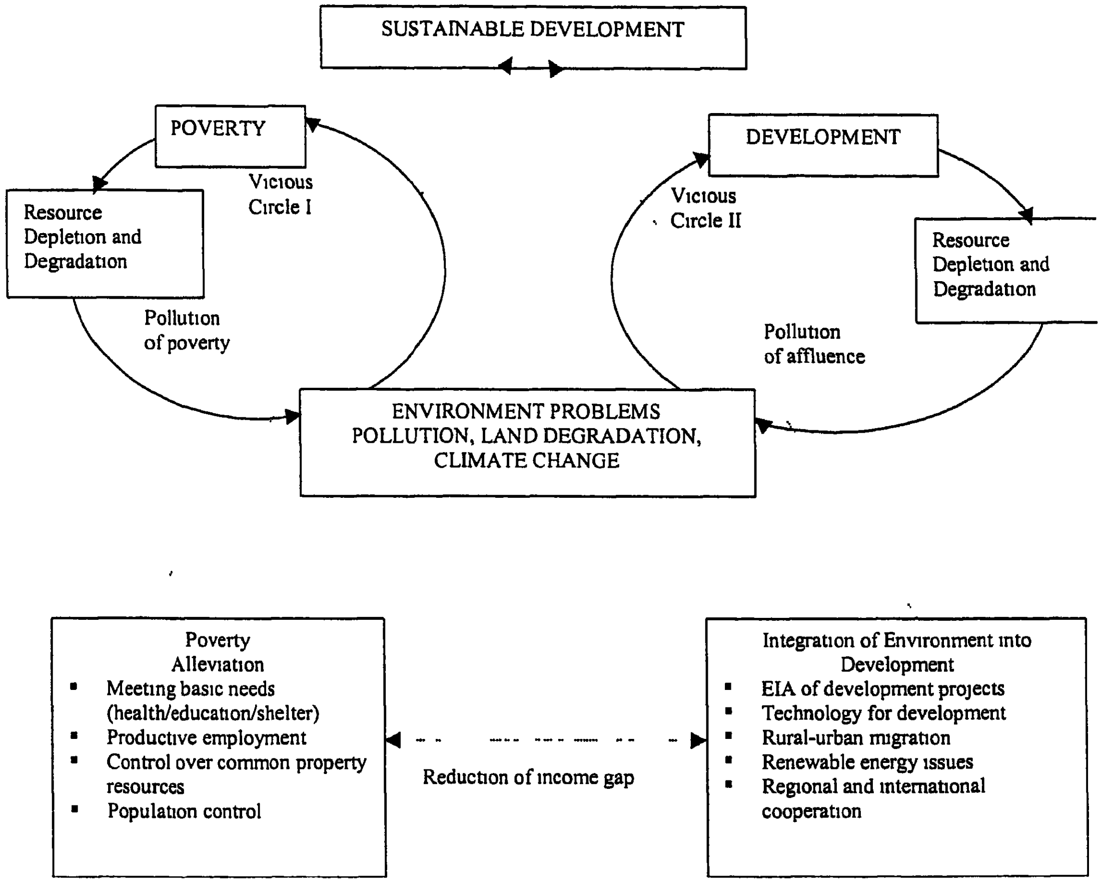
SUSTAINABLE DEVELOPMENT
POVERTY
Resource Depletion and Degradation
Vicious Circle I
Pollution of poverty
DEVELOPMENT
Vicious Circle II
Resource Depletion and Degradation
Pollution of affluence
ENVIRONMENT PROBLEMS POLLUTION, LAND DEGRADATION, CLIMATE CHANGE
Poverty Alleviation
Meeting basic needs (health/education/shelter)
Productive employment
Control over common property resources
Population control
Reduction of income gap
Integration of Environment into Development
EIA of development projects
Technology for development
Rural-urban migration
Renewable energy issues
Regional and international cooperation

Figure 2.1. Linkages between institutional development environment and poverty

Therefore, poverty can be considered as the most profound social trap in which the short run, local reinforcements guiding individual behaviour are inconsistent with the long run global best interests of individuals and society. Social traps also indicate imperfections in the unregulated free market approach to resource allocation, which relies on short term, local optimising behaviour of individuals. Social traps are also abound in environmental issues because of the absence of well defined property rights and the pervasiveness of environmental externalities. They are analogous to what is commonly termed as "tragedy of the commons", a situation that represents a breakdown or absence of institutional mechanisms for co-operation and resolution of conflict between individuals and community interests in the management of common property.

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[4] TERI study in India estimates that one meter SLR (See Level rise), would affect 0.41% of India's coastal area affecting 7.1 million people (mostly poor) due to climate change

The key objective of development should, therefore, be to enable disadvantaged groups of the society to widen their decision-making horizon Incentives should be provided in such a manner that the short-term behaviour is consistent with the long-term goals of resource management. Besides the goal of increase in income, development objectives should incorporate the concept of quality of life. Providing essential infrastructure, opportunity- capacity building or skill formation, and a sense of voice in the society is the basic step towards poverty reduction.

Energy, economic development and the poor

Role of energy sector in the process of economic development

During the industrial era, investments in the energy sector were mainly concentrated to improve and expand the energy supply situation. By expanding access to reliable sources of energy, gas, electricity, petroleum products- for agriculture, industry, commerce and households, governments have primed growth in productivity and output. But in recent years, the focus of their interventions have shifted from investing public funds in large scale energy projects to mobilising private investments and adopting commercial standards through structural, regulatory and ownership reforms. Whatever be the approach, the link between energy and economic development remains indisputable (World Bank, 1994)

At a very general level, development can be viewed as a process of increasing the variety of choices or options open to a society and to the individuals living in it. In practice this variety has been achieved due to economic growth and social welfare. Therefore, with economic growth, subsistence agriculture is replaced by cash crops, thus leading to increased income, therefore, enabling increased expenditure on quality of life, like health, education etc, leading to increased social welfare.

The energy sector is one of the most important sectors considered, as a major contributor to economic development. Studies have established the strong correlation between energy consumption and economic output, for both the rural economy and for individual sectors. A study reported that the economic growth rates of non oil exporting LDCs dropped by an average of over 50% after the oil crisis in 1973, while the growth rates of oil exporting LDCs increased over 20% on an average [5]. This means that increased energy supplies can foster economic growth in the LDCs.

The study of relationships between sectoral economic production (in agriculture, industry and transportation) and energy consumption has shown[6] that per-capita commercial energy consumption and GDP per capita are significantly and positively correlated over time within countries for most of the LDCs. Further, the correlation between commercial energy consumption and GDP per capita is significantly higher for countries with higher GDPs. All oil exporters have highly correlated energy consumption and GDP.

Therefore, the energy sector is one of the important sources that provide input to economic development. The income of the poor also rises with overall economic growth. All business formal or informal, large or small, rural or urban, requires the use of energy. Besides being an important input for the economy, energy is essential for fulfilment of the basic needs- like cooking (food) and lighting. In fact in some countries, energy is basic need- cold countries require constant supply of energy for heating purposes.The main role of energy in the economic and social wellbeing is described below:

Energy for fulfilment of basic needs

Energy is required for cooking, heating and lighting purposes in the residential sectors.

Energy utilisation in the formal sector

Energy in this sector is needed to:

- To transform raw materials into plastics, cement glass, paper and food products,
- For transportation needs in the manufacturing sectors, transportation of good in the market and also for transportation of the population,
- To operate essential business infrastructure- communications, lighting, and office equipments.

Energy utilisation in the rural non-farm sector

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[5] The MITRE corporation, Energy and Development· A preliminary analysis of less developed countries, MTR-79w00216, 1979

[6] MITRE Corporation, Energy and development: extended analysis and implications, May 1980.

Small business in the rural sectors can be a significant source of income and employment, most of these businesses require reliable energy supply (particularly electrification).

Energy utilisation in the farm sector

Energy enables mechanisation of irrigation and crop and animal husbandry and therefore leads to increased income as a result of increased farm productivity. Energy used for irrigation purposes (to pump water) can also increase the number of crops per year. Green revolution in India was mainly due to increased energy use in agriculture, and irrigation facilities have allowed three rice harvests per year in Vietnam.

Energy services and the poor

The link between energy and poverty alleviation is less well understood, due to the many indirect (and therefore often not so obvious) relationships between the two. However, that access to better and cheaper energy services improves the welfare of the poor, seems obvious.

Energy and household welfare

Households require energy first to meet some of the basic needs, and then as their income increases to access the facilities for a better quality of life. The major forms of energy utilisation can be classified into direct and indirect.

Direct services of energy

Basic needs: all households require some minimum amount of energy to meet basic subsistence needs.

- To cook food: for majority of the poor households, energy is often consumed in the form of firewood, straw, dung or other biomass.
- To illuminate their immediate environment to function after dark, poor households often obtain energy in the form of oil lamp, candles and dry cell batteries.
- To heat the home to survive in the extremely cold winters in some parts of the world.
- Small enterprises that run on efficient supply of energy (like power) leads to enhanced income and employment opportunities
- Energy utilisation in the agriculture sector (mainly for irrigation)

Indirect services of energy

Welfare enhancing amenities: once the basic needs of the households are satisfied, the additional demand for energy arises for other amenities and services that enhances welfare. For example,

- Commercial cooking fuels that reduce the time spent gathering and preparing traditional biomass fuels, as well as the indoor smoke from using the traditional fuels.
- Improved electric lighting at the household and community level to enhance educational attainment, perform task more easily and reduce security risks.
- Appliances such as fans to make homes more comfortable, and refrigerators to preserve food.
- Access to information, entertainment, and communication- TV, radio etc.
- Potable water supply and sewerage system that depend on energy for pumping, system monitoring and cleaning.
- Pumping water for irrigation purposes.
- Access to health care and maternity clinic, which needs energy for lighting, diagnostic equipment and vaccine preservation.
- Transportation services to obtain access to other inputs and travel to jobs and schools.

The energy ladder

Population growth, paucity of resources and lack of economic opportunities create pressure for the poor to exploit ecologically fragile marginal rural and urban environments for survival. Resource degradation thus jeopardises growth in the long run and leads to increased poverty since the poor are directly dependent on natural resources for their survival. We examine below the energy environment and poverty linkages and their implications.

Currently, just over a billion people in the industrialised nations consume as much as 60% of the world's commercial energy supply while 5 billion people living in the developing countries consume the remaining 40%. The billion well-off people use 25 times as much energy as the poorest billion, and about 1.6 billion people have no access to reliable modern forms of energy such as electricity, gas, and liquid fuels. Many of these people live in the developing countries and for the greater part, are poor.

Energy in itself is not a basic human need. However, it is required for meeting any and all of the basic needs - food, shelter, health, education, employment, etc. These needs may be met through various energy carriers- biomass, charcoal, coal, kerosene, electricity and LPG to name some. Together these carriers are commonly referred to as an "energy ladder" as shown in

Figure 2.3. The figure illustrates that with increasing incomes, people shift to more efficient, cleaner, and more expensive but convenient fuels. In so far as total energy use increases with income, the ladder may also be thought of to widen as one climbs its rungs. Data on cooking fuels in households classified by monthly per capita expenditure (MPCE) in both rural and urban areas in India support the notion of an energy ladder. It is revealing to note here that in a predominantly rural country, around 78% of rural (and 30% of urban) households depend on firewood and chips. Cross-country data is also consistent with the concept of an energy ladder (Reddy et al 1997). Thus both poor countries and people living in poverty within these countries are disproportionately positioned on the lowest rung.

Impact of energy services on the poor

There is substantial and consistent empirical evidence that economic growth is a necessary, but not sufficient, condition for the reduction of both absolute and relative poverty. In general, there is broad agreement on the direction of links between energy and poverty reduction, but hard data on absolute or relative magnitude of welfare effects of different interventions in the energy sector is neither available nor easy to work out. Electricity is the most convenient form of energy for most applications other than transport and even small quantities dramatically improve the quality of life. However, the consumer–supplier links at the point of delivery are notional, which makes it difficult to identify direct project beneficiaries (except for projects extending supply only to new consumers such as rural electrification schemes).

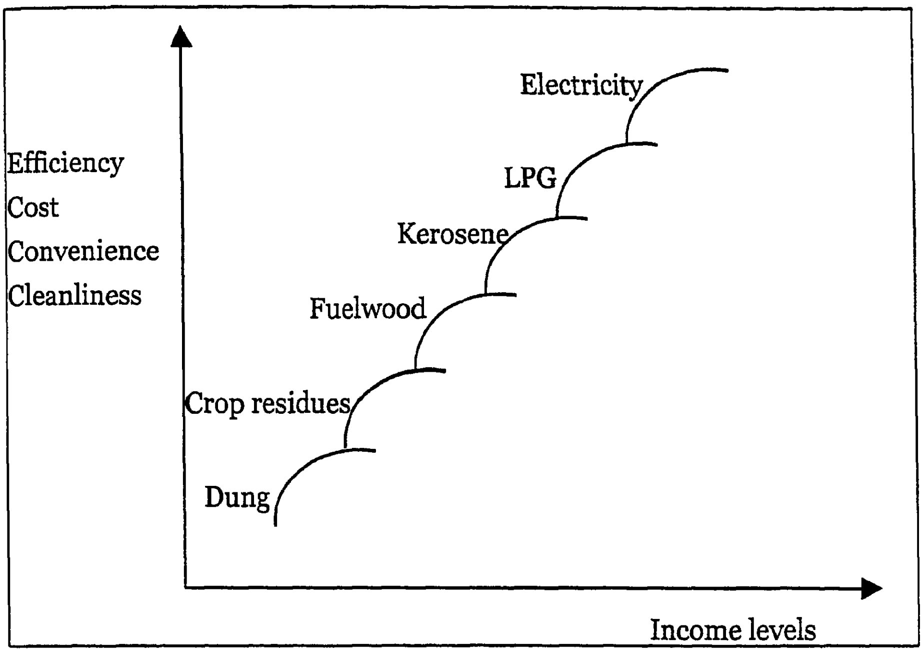

Figure 2.2. Energy ladder

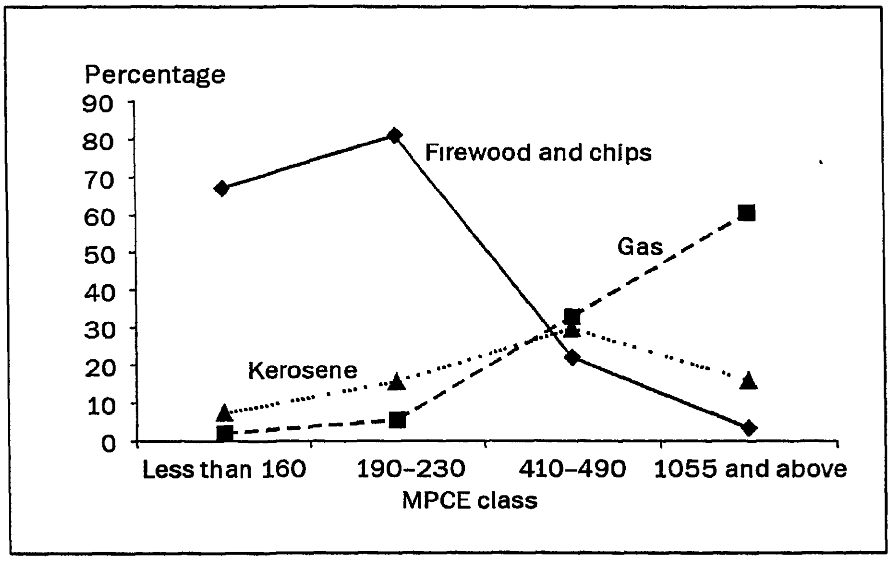

Figure 2.3. Urban households using primary fuel for cooking across income classes

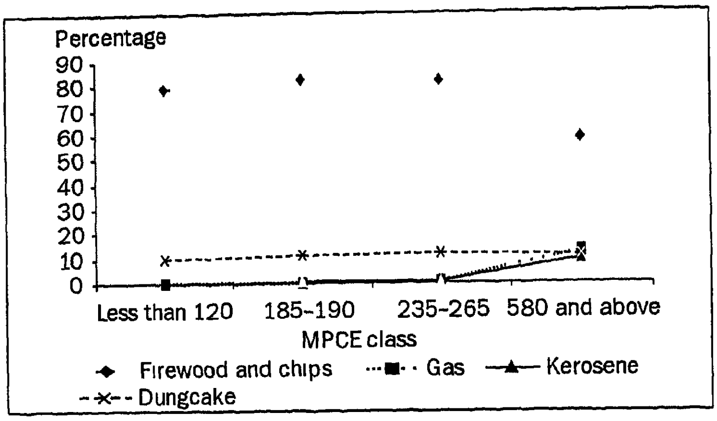

Figure 2.4. Rural households using primary fuel for cooking across income classes[7]

Improving access to and broadening the choice of energy sources for households and rural communities may affect welfare among poor households in several ways: it allows them to shift from biomass fuels to kerosene or gas for cooking, install electric lighting in homes and schools, and use refrigerators in community health clinics. Such interventions may enable households to use more energy services, either because the access is provided for the first time, or it reduces prices when compared to cash and non-cash costs of traditional energy sources. Greater use of energy services may result in other benefits, particularly better health and education, and improve access to and productivity of labor market.

Access to modern forms of energy may have other direct welfare effects on poor households in terms of time and effort because of reduced need to gather biomass and other traditional fuels, and extend productive activities to evenings. This allows diversification of household labor and results in increased individual labor productivity. While diversification of labor allows the households to reduce risk exposure and vulnerability by increasing the number of household income sources, increased labor productivity is directly income enhancing. As income rises above subsistence levels, energy for lighting, refrigeration and productive activities brings possibilities for introducing more advanced welfare enhancing measures in education, health, and communication.

Use of even small quantities of energy can have substantial effects on household coping strategies (to face disasters) and welfare. There are some indirect effects of improved energy services, which generally arise from two sources: improved efficiency of the sector resulting in larger national wealth, and savings from cuts in poorly targeted, non-transparent subsidies. The impact of these on the poor depends on the way the benefits will be distributed.

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[7] **Source** NSSO (1997) as cited in TERI 1999a

Poor households face obstacle of high upfront costs of connections, fixtures and appliances in switching from traditional to modern and more efficient forms of energy. Once households gain access, their energy consumption depends on affordability. The pricing of fuels influences the amount consumed and the share of income it absorbs. Energy consumption and income are positively related, but while energy spending rises with income, it generally does so under proportionately. The poor generally spend a much higher portion of their income on energy than the rich. Use of instruments to defray the up front costs and well- targeted subsidies can help mitigate this situation.

The delivery of basic human needs, like potable water, sanitation, primary health and basic education; and improved employment opportunities are commonly pursued for poverty reduction. These benefit the poor and disadvantaged directly by strengthening their capacity to earn more and withstand misfortunes. However, delivery and monitoring of these poverty reduction measures are positively influenced by the availability of modern forms of energy, particularly electricity. Piped water, refrigeration, electric lighting, and telecast educational programs have a positive welfare impact on communities. In the context of employment and income generation opportunities, the beneficial results of providing modern forms of energy are more visible. Agricultural implements, including pumped irrigation, help increase productivity and output, which potentially benefits both the owners and the poor farm workers. Availability of powered vehicles brings communities closer to markets. In case the region has natural resources and other factors of production, availability of electricity allows entrepreneurs to establish manufacturing facilities and provide formal employment to a larger number of people, which in turn brings more income earning opportunities to the poor. Availability of electricity allows communities to develop cottage industries, like weaving using powered looms, for earning higher incomes. Electricity can also bring new opportunities at the household level, as lighting extends store hours, refrigeration allows stocking of a wider range of goods, and services like tire repair can be started. Electricity helps improve communications and media coverage that bring communities closer. In general, provision of electricity increases productivity, which is reflected as higher wages in the organized sector, and in the cottage industries as higher household incomes.

New investments in energy sector projects on their own will not be sufficient to reduce poverty. Integrated social efforts and investments other than in energy development are essential for removal of the causes of poverty.

Table 2.1. Potential effects of improved energy services in reducing poverty

Direct effects on well-being	Direct effects on health	Direct effects on education	Direct effects on economic opportunities for the poor	Trickle-down effect of increased productivity	Fiscal space (coupled with pro-poor policies)
Improved access to lighting, heat and refrigeration	Improved indoor air quality through cleaner fuel	Improved access to lightning, allowing more time to study	Easier establishment and greater productivity of businesses that employ the poor	Easier establishment and greater productivity of business in general (including through positive impact on the environment)	Smaller fiscal burden and higher fiscal returns from more efficient services
Savings in time and effort (due to reduced need to gather biomass and other fuels)	Reduced fire hazard Improved quality of health services (through better lighting, equipment, and refrigeration)	Savings in time and effort, releasing time and energy to channel to education	Creation of employment in infra- structure service delivery		More benefits to the poor if government spending is effectively channelled to welfare-enhancing services
Improved access to information (through radio, television, and telecommunications)	Easier establishment of health centres Better education		Improved health and education and savings in time and effort, increasing individual productivity		Higher fiscal returns associated with higher growth, coupled with pro poor policies

Source The World Bank and Energy Sector Management Assistance Program, 2000. Energy Services for the World's Poor Washington, D C.

Energy and environment

There are multiple links between energy, poverty and the environment. The production and use of energy have environmental consequences to which the poor are especially vulnerable. Current patterns of energy consumption among the poor tend to further aggravate poverty. They rely on diverse source of energy, often the real unit costs of which are high relative to those of electricity or gas delivered through network to wealthier households (ADB, 1999). Moreover there are high non-monetary prices that the poor have to pay. This price can be measured in terms of time and labour, health and social inequity, particularly for women. Among the most serious costs of energy scarcity for the poor are - the range of health problems it causes. Compared to LPG and kerosene, traditional fuels generate more respirable particulate matter (RSP), Carbon monoxide, sulphur oxides and polyaromatic hydrocarbons. Women and children in poor households are the most exposed to these pollutants, making them vulnerable to acute respiratory infections, chronic pulmonary diseases, cancer, tuberculosis, blindness, etc. A survey of 80 urban households in 2 slums of Delhi showed that daily exposure of infants to RSP in wood and kerosene using households is 10-16 and 10-12 times the WHO limit (TERI, UNEP 1999). In fact, the total human exposure to many important pollutants may be much more substantial in the homes of the poor in developing countries than in the outdoor air of cities in the developed world, due to high concentrations and the large population involved. Table 2.2 summarises the adjusted values of the environmental impacts of a Yunan Pulp Mill project in China (ADB 2000).

Table 2.2. Quantification and Economic Valuation of Major Environmental Impacts

Impact	Change	Unit Value	Annual Value
Human health and welfare TSP(PM_{10})	5 961 5/yr	Human health $45,94-76.57 per ton Human welfare $5.10-8 51 per ton This range of values was transferred from US studies of health and welfare values. Several adjustments were made to update the values from the Yunnan Paper Mill Project	Health· $273,848-456,434 Welfare $30,401-50,728
Human health and welfare. SO_2	64 t/yr	Human health $9,57-16 59 per ton Human welfare. $3.19-8.54 per ton This range of values was transferred from US studies of health and welfare values. Several adjustments were made to update the values from the Yunnan Paper Mill Project acid deposition impacts on fisheries have been excluded.	Health $612-1,062 Welfare $204-355
Human health and welfare NO	721 t/yr	Human health $14,46-28 93 per ton Human welfare $2 55-5.10 per ton This range of values was transferred from US studies of health and welfare values. Several adjustments were made to update the values from the Yunnan Paper Mill Project.	Health· $10,426-20,859 Welfare: $1,839-3,677
Human welfare Fishery resource	Not known	$1.10 per kg The unit value is based on fish prices in Yunnan province	Not estimated

PM_{10} - particulate matter less than 10 microns; SO_2 - sulfur dioxide; Nox - nitrogen oxides; TSP - total suspended particulates, kg - kilogram

Source. P Aveygunavardane et al Environment and Economics in project preparation· 10 Asian cases (2000)

Besides the health impacts, low levels of energy services are a serious obstacle to social and gender equality. The poor, especially women invest a large portion of their most important asset, their time to the production of energy services. Women and girls in poor households are trapped in an unceasing cycle of work that deprives them of education and equal participation in local development programmes. A study conducted by the Centre for Science and Environment in a Himalayan village found that women put in 59% of the total annual work hours in the village, children 26% and men only 15 % (CSE 1999). Another implicit cost is the extremely low efficiency (i.e. the fraction of energy released from the carrier that is actually turned into an energy service by the end-use devise) of traditional fuels. The cook-stove efficiencies of firewood, kerosene, and gas are roughly 15%, 50% and 65% respectively (Reddy et al. 1997). Added to these costs should be the social costs of deforestation and land degradation caused by dependence on firewood. Further, as has been explained in the earlier sections, there exists an important though complex relationship between poverty and environment. The poor rely directly and to a significant extent on the natural resources. This means that not only does inequality foster unsustainability but also that a degraded environment can accelerate the process of impoverishment. Box 2.1 illustrates this relationship between poverty and the environment.

Box 2.1 Abstract of "Poverty reduction and human development in the Caribbean: a cross-country study", World Bank discussion paper no. 366, 1997

The small island economies of the Caribbean have made substantial advances in their economic and social development over the past two to three decades of independence. Yet problems of poverty are still pervasive in many countries where living standards have actually declined in recent years The region will also face an uncertain period of transition ahead as global competition increases, and donor flows decrease

Among the characteristics of the poor, more than one half live in rural areas and work in agriculture where the rural poor have limited access to quality health and education services, infrastructure, and in some cases farmable land Urban poverty is also a major problem, particularly in the larger countries The urban poor are more vulnerable to macroeconomic fluctuations, their living conditions are overcrowded, and they face the social problems of crime and violence which exist in many Caribbean cities While the steady increase in crime and violence has degraded the quality of life for all socio-economic groups, these problems particularly impact on the poor. The social problems have also had high economic costs

The causes of poverty in the Caribbean are linked to several complex, interrelated factors These include low or negative economic growth, macroeconomic instability, deficiencies in the labour market resulting in limited job growth, low productivity and low wages in the informal sector, and a decline in the quality of social services Accordingly, countries that have sustained high economic growth rates and invested heavily in the social sectors have experienced reductions in poverty levels.

Every country in the region has a mix of social safety net programs designed to provide assistance for the poorest In addition family members and communities have found ways to cope during difficult times through community based initiatives, migration, remittances from relatives abroad, and the search for new sources of income Yet with the declining resources, increases in poverty, and an ageing population in many countries, the safety net programs have become strained and informal safety nets of the extended family are also coming under pressure.

To alleviate this situation, energy supplies need to be expanded to progressively reach out to all those who do not have access to modern forms of energy. The poor, in particular, need to be provided with a minimum amount of energy at affordable price. To be able to do so, the cost of producing and supplying energy needs to be reduced. Cleaner production processes for energy need to be adopted to minimise environmental degradation, something that often affects the poor the most. Therefore the main goal that needs to be integrated in the country's energy policy is to increase the availability of energy in a least-cost and environmentally friendly manner and to increase access to energy for people particularly the poor. In pursuing the above goal, certain interventions are required in the energy sector that will support the overarching objective of poverty reduction. The operational priorities that can be particularly relevant to the energy sector are (i) protecting the environment, (ii) promoting good governance, (iii) promoting private sector development, and (iv) promoting regional and sub-regional co-operation.

The priority for the poor is the satisfaction of basic human needs, such as food security; productive employment; and access to health services, education, housing, clean water and sanitation. As the basic needs get satisfied, access to modern forms of energy becomes important due to the beneficial direct and indirect impacts, but the actual level of energy consumption is influenced by the available rural energy services and their affordability. Pro-poor energy supply implies that the focus should be on maximising its impact on poverty reduction rather than output. The challenge lies in doing it in a cost-efficient way.

Conclusion

Given the important role of energy sector both for economic development and in improving the wellbeing, certain energy development goals have to be developed so that appropriate policies can be designed by the government that would enable effective targeting of the poor. The World Bank has come out with five specific energy development goals to enable policy makers help focus on the poverty diagnosis and strategy development effort which are discussed in the next chapter. Energy policies therefore have a key role in the development strategies of government. Improved, easy and reliable access to reasonable priced energy help growth in the industry, agriculture and commercial sectors. For the household sector, better energy services can lead to increase wellbeing-less time spent on collecting biomass, health benefits, better education facilities etc, thereby increasing income capabilities of the household members.

In the past, government in the developing countries had focussed on direct investments on system expansion. However, more recently, the focus have shifted to reform institutional framework that supports investments and service delivery and on reforms to enhance the operational efficiency and towards efficient mobilisation of finance for system expansion and improvement (WB 2000)[8]. The following chapter outlines in detail the types and nature of policy interventions required for sustainable energy development.

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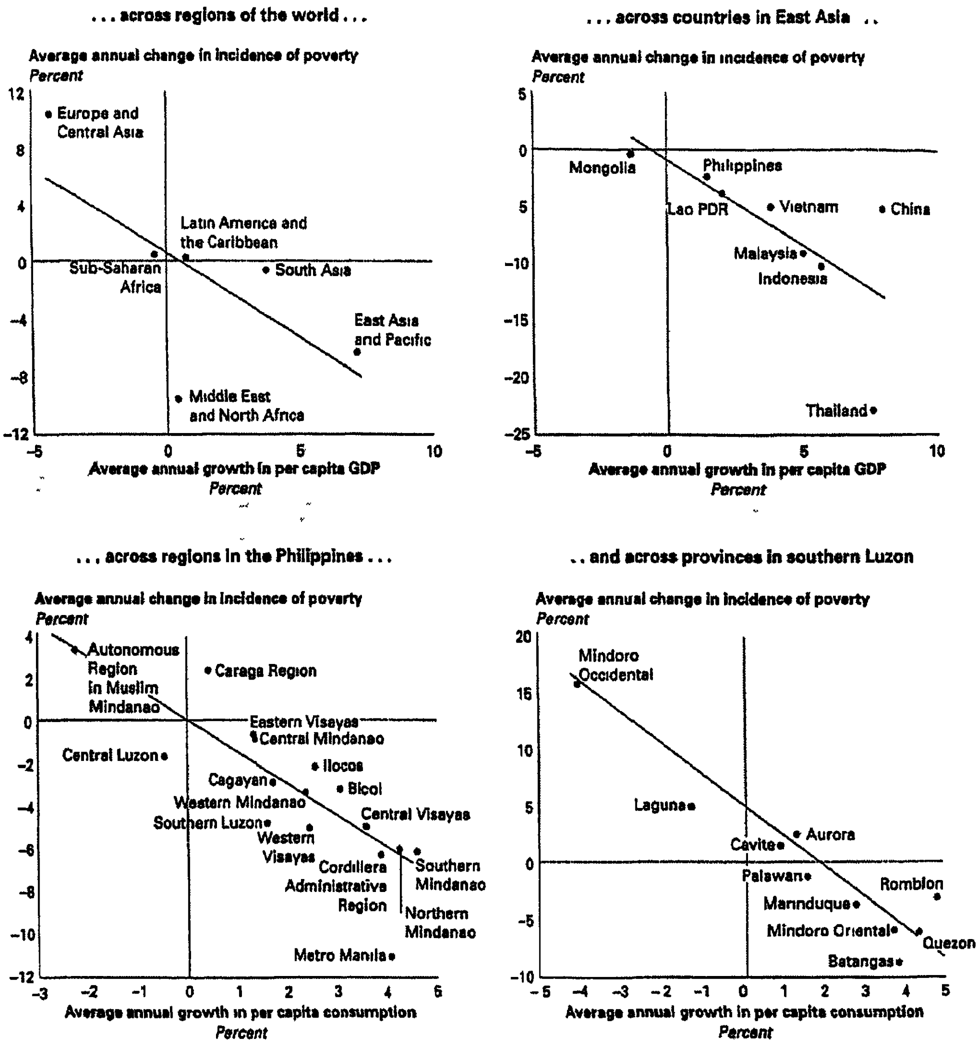
[8] World Bank, Energy services for the world's poor, ESMAPI, energy and development report, 2000.

Box 2.2. Economic growth was a force for poverty reduction in the 1980s and 1990s



Note The incidence of poverty is the share of the population living on less than $1 a day

Source Top left panel World Bank data, top right panel, World Bank 1998f, bottom two panels, World Bank 2000o

3

Policy interventions for sustainable energy development

Goals for sustainable growth and poverty reduction through energy projects

Government in the developing countries are undergoing a process of major debate and soul searching as to the nature of investments that should follow in the energy sector so as to reap maximum impact on poverty reduction. With policy makers wanting to improve services for the poor, the critical question is: what kind of energy policies and energy projects will be more successful in targeting poverty reduction.

Bilateral and multilateral funding agencies are also working towards charting out the most effective antipoverty operations in the energy sector and therefore looking for the right modality of assistance. The recent energy sector policy review of the Asian Development Bank (mentioned in details in the next chapter) stresses the need for designing the energy sector policies to support pro-poor, sustainable economic growth and good governance (two of the three pillars of poverty reduction strategy (ADB 1999).

In the proposals that were prepared for the energy section during the Earth summit in 1992, it defined a minimum level of energy services as a general human right. The preamble of the energy chapter noted that " more energy services are urgently needed in a large number of countries in order to create a decent standard of living especially in the developing countries"(UN 1992).

However, in order to understand how and what type of interventions in the energy sector affects the poor, the links between energy and poverty reduction have to be clearly understood. The framework (TABLE 3.1) given below, (as developed by the world bank), reflects on five energy development goals linking them to the four poverty dimensions of income, capabilities, security and empowerment (WB 2000). It explains the links between properly designed interventions and effective poverty alleviation. The suggested goals are interlinked and reinforce each other, for example improving governance improve accessibility while fiscal sustainability ensures reliability and accessibility.

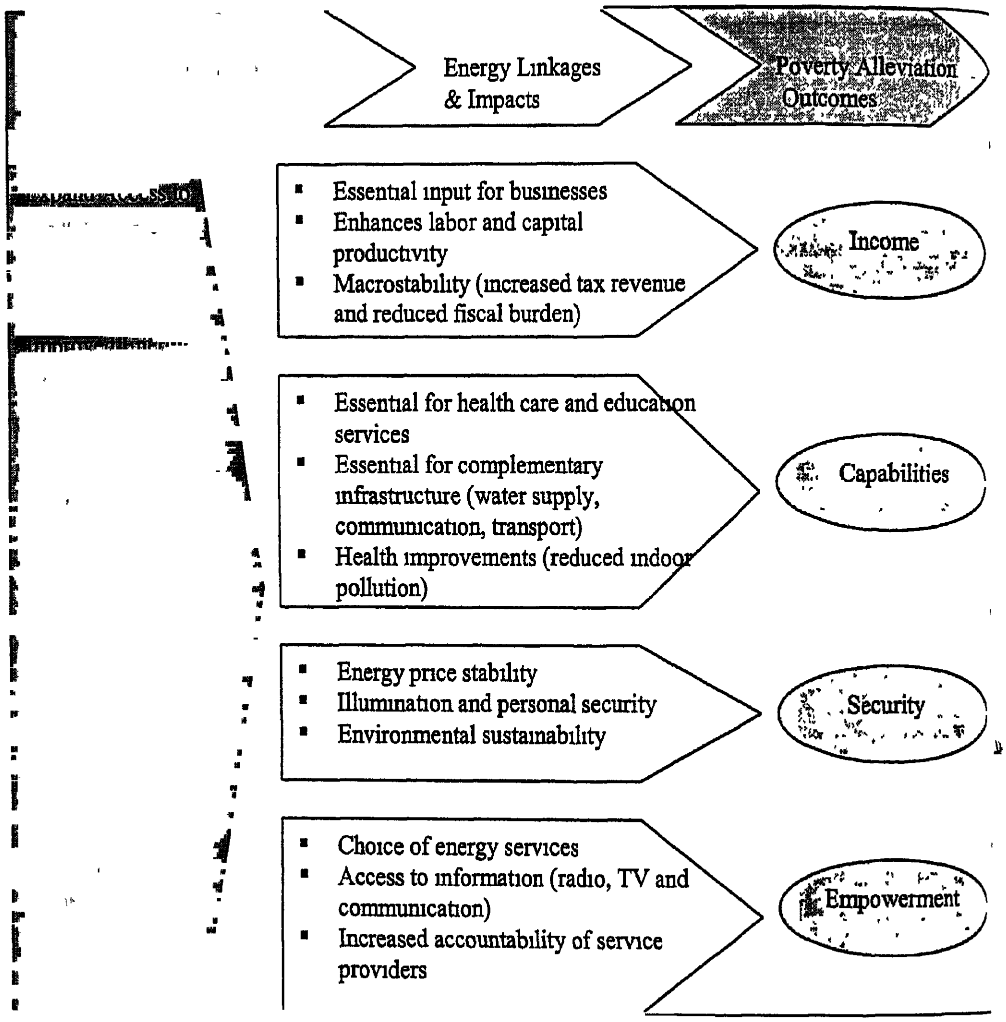

Energy Linkages & Impacts
Poverty Alleviation Outcomes
Essential input for businesses
Enhances labor and capital productivity
Macrostability (increased tax revenue and reduced fiscal burden)
Income
Essential for health care and education services
Essential for complementary infrastructure (water supply, communication, transport)
Health improvements (reduced indoor pollution)
Capabilities
Energy price stability
Illumination and personal security
Environmental sustainability
Security
Choice of energy services
Access to information (radio, TV and communication)
Increased accountability of service providers
Empowerment

Figure 3.1. The Energy Poverty Framework

Within this general framework, poverty reducing interventions in the energy sector can be classified as:

- Short term interventions, such as those that sustain the supply of basic services to the poor during emergencies
- Medium term interventions such as those that help address structural issues affecting delivery of basic services and other targeted poverty interventions
- Long term interventions, such as those that stimulate pro poor growth and encourage expansion of the private sector

Within this background, we provide below the type of policy interventions that would fit in within the broader objective of the goals mentioned in figure 3.1 and therefore, lead to effective poverty reduction.

Expanding access to modern forms of energy

Providing access to modern forms of energy is one of the most effective ways to have a direct impact on the poorer section of the society. The energy ladder (explained in chapter 2) clearly illustrates the vital link and the interactions between poverty and modern energy consumption. Improving the access to and broadening the choice of energy sources for households and rural communities allow them to shift from using biomass-based fuels to kerosene or gas for cooking, to use electricity at home and also at schools and to use a refrigerator in the health clinics, thus enabling a movement upward in the energy ladder. Interventions of this kind will, therefore, have important direct impacts on the welfare of the poor. Households may use more energy services, either because the access was provided for the first time or it is more economical to use as compared to the traditional fuels (relative cash and non cash benefits are more for modern fuels). The major trade-off for the users in this case is between the monetary and time costs as they progress from traditional to intermediate costs. Therefore, the time and energy saved can lead to better health, more time for education and increase in earning potential.

This diversification of labour reduces the degree of vulnerability among the poor by increasing the number of income sources. Women and children who earlier spend majority of their time on collecting fuelwood, or water, would now be able to enjoy the benefits of better health and education. Besides the rising income, the increase in access to modern energy systems will improve the quality of life by providing some of the basic human needs like potable water, sanitation, primary health and basic education[9].

However, one has to keep in mind that accessibility is a function of affordability and reliability. As the field visits to some of the project sites illustrated, high costs of connection and the fuel price deter households from accessing the electricity connections even though they may be present[10]. Poor households face the obstacles of high upfront costs of connections, fixtures and appliances in switching from traditional to the modern forms of energy. Proper pricing of the fuels is also vital for continuation, as this determines the amount to be consumed and the share of total income that this sector absorbs. Studies have illustrated that consumption of modern energy increases with increase in income. Table 3.1 illustrates the same.

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[9] Refer to chapter 2 for more detailed analysis of the impact of improved access of energy to the poor

[10] Refer to the appendix 1 for the summary notes of the field visits in the Philippines

Table 3.1 Fuel use in forty-five cities, by ease of access to electricity

Access to electricity	Average monthly h.hold income (in $)	Average population (thousands)	Wood	Charcoal	Kerosene	LPG	Electricity
Percentage of households using fuels							
Very difficult	33	67	56.4	73 4	57 6	26.6	21 1
Difficult	67	174	72.3	33.5	65 2	21.8	42.6
Easy	62	514	24 1	62.7	50 4	21.6	47.7
Very easy	77	1153	22 1	34 5	42 6	47.	90.5
Fuel use (kgs oil equivalent per capita per month)							
Very difficult	33	23	1.31	10 09	0 35	1 49	0.24
Difficult	67	174	7 27	2 54	0.46	0.91	1.24
Easy	62	514	2 83	7.20	110	0.50	2.00
Very easy	77	1153	1.71	1.75	1.5	2.00	2.79

Note. The data are from households surveys in twelve developing countries in various years from 1984 to 1993

Source. Energy service management assistance programme household surveys, 1997

Therefore, along with the improved access to modern systems of energy it is also essential that some measures for making the accessibility of such systems affordable to the masses, especially the poorer sections of the society be undertaken. The policy interventions to improve the accessibility of modern energy systems should be in combination with the policy of effective and targeted subsidies to be made available to the poor, and a proper energy pricing policies. However, one needs to bear a note of caution while incorporating these components, as subsidies, if not targeted, lead to more disproportionate impacts and energy pricing policies, if not designed properly, may turn out to be a burden on the supply system, making projects financially more unviable. In developing countries where the electrification ratio is very low and only a privileged section of the society has access to electricity and commercial fuels, the diversion of the state's general tax revenue to subsidise electricity and fuel consumption may lead to moral and governance related questions.

Therefore, while designing policies to increase of what can be termed as an "effective accessibility" to modern systems of energy; the following have to be kept in mind.

Improving the affordability function of poorer households

As explained earlier, high up-front cost of accessing the connections is a major burden for the poorer fraction of the society. This can be partially unburdened by either providing financial support for the minimum consumption of electricity by the poorest sections of the society who cannot afford to pay the full price by introducing a low lifeline tariff[11]. In fact, designing of the tariff system is crucial in determining how the benefits of electricity reforms are to be distributed.

a. *Effective credit policies in place*

The government can help in mitigating these costs partially by organising access to credit facilities through institutions like Grameen bank, regional rural banks, or micro credit programs for consumers to help adjust the high up-front costs of acquiring the connections. Very low interest rates could be charged for the same. For example, in India, loans for renewable energy have now been included among the priority areas of lending.

b. *Ensuring the financial and commercial viability of the energy supply entities*

Though it is acknowledged that providing modern forms of energy should be one of main priority of the government, this has to be done not at the cost of diluting the financial and commercial viability of such projects, as this may prove detrimental in the long run. The following guidelines can help in ensuring the commercial and financial viability of the supply entities:

- a reasonable mix of profitable urban and rural areas should be delineated while franchising so as to help balance the financial/commercial viability
- allow collection of higher tariff from the large rural consumers[12], so as to enable the utilities to recover the higher costs.

c *Promoting the use of decentralised energy systems*

While promoting increased accessibility of energy services for the poor areas, attention should also be paid to ensure that the distribution system are not forced to expand unless the expansion is least cost option as compared to promoting decentralised energy options such as constructing mini grids using small diesel generators or in combination with renewable energy options. In fact, promoting renewable energy system is one of the most effective way to impact poverty reductions. Many studies have illustrated the vital link between renewable energy and poverty reduction. The later section in this chapter will illustrate some of the links and the options of renewable energy for poverty reduction.

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[11] Lifeline tariffs essentially involves subsidising electricity only at the very low levels of consumption. The subsidies apply to very low consumption of electricity and do not cost too much.

[12] Large rural consumers can include, farmers with large landholdings, or rural consumers with high total consumption (either for domestic use or for business purposes).

d. Integrated planning and programme designing

Much of the interventions mentioned in the earlier sections should coincide with rural development projects covering water supply, irrigation, public health facilities, and education facilities. For example, providing electricity connections in a school, with no other infrastructure, say a teacher, or chairs or tables may not lead to the effective use of that facility.

To conclude, providing increasing access to modern form of energy system is not enough to revolutionise the access by the poor. However, effective interventions coupled with competitive and profit seeking private participation and effective and targeted subsidies can help achieve long term sustainability and will, therefore, be sensitive to the needs of the poor[13].

Improve energy supply reliability

Providing accessibility without ensuring reliability of the supply function will affect the sustainability function of that system. As explained in Table 3.1, improving energy supply reliability has impact on income, capability and security dimensions of poverty. Reliability may be defined as the state of stable supply of energy services at a quality and quantity that do not impose excessive additional costs on consumers. Reliable supply of energy is essential for making sustained improvements in household welfare and is an input to businesses for generating economic growth (world Bank, 2000).

Lack of reliable supply has often been the major disincentives to make investments required for transition from a traditional energy source to a modern energy system, more so for the poorer section of the society. Studies have established vital positive correlation between reliable energy supply and willingness to pay (especially by the poor). The field study conducted in Philippines as part of this study also substantiates these findings. For example, a reliable supply of kerosene and electricity will be a factor in a poor household's perception of energy security allowing them to consider taking larger investments in stove or gas connection.

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[13] See chapter 4 for criteria of the indicators to help design the each of the policy interventions

Business in the rural areas especially are directly dependant on a reliable source of income. For example, in the Philippines case study, it was quoted that a particular printing machine enterprise which was a major source of employment to atleast 60 of very poor households often suffered due to the unreliable supply of electricity. Besides being a source of income, reliable energy system is also essential for a better quality of life, namely, for educational facilities, for the health clinics to be able to store important medicines and perform certain vital check-ups. Therefore, ensuring a better and reliable source of energy system is essential for having a positive impact on the poor.

The major factors that could enable maintaining a reliable supply status are explained below:

Community participation in management of distribution

As one of the main reasons that could lead to snags in the supply function is increasing cost of the utility coupled with inadequate cost recovery. Co-operatives and community groups could be effectively used as a vehicle for delivery of energy services to the poor. Community management of billing and collection can improve the payment discipline. Also, involving the community while designing the regional network system can help in making the design more feasible and workable.

Encouraging rural electrification programme through selective grid and off grid programmes depending upon the economic limits.

Providing electricity connection to the remote and very few numbers of households in the rural area is sometimes uneconomical through the grid connected network and, therefore, most of the time, leads to unsustainable delivery mechanism. In those areas the focus should be to promote the off grid connection. Integrating natural gas development (where it is a cheaper mode) as a part of urban planning is one of the most cheapest and effective ways of ensuring an upper movement in the energy ladder.

Ensure fiscal sustainability

The marginal impact of fiscal instability and increasing deficits affect the poor more, increasing their state of vulnerability. Though fiscal stability is a function of many factors, the energy sector is one of the factors that can influence the budget in the form of taxes and royalties, subsidies, debt service and current spending, and in the form of share of government borrowing and fiscal risk. Therefore, the energy sector policies can have a large impact on the macroeconomic instability. The main policy interventions that would enable a sustainable and sound contribution to the macro economic stability are mentioned below:

Effective consumer pricing principles

Imposing taxes on fuels can be an effective method of generating revenue and therefore, also contributing to the government exchequer. Because of the inelastic demand for energy, policies like these may lead to increased collection. However, deciding which fuel to tax is an important decision as it may have severe implications on the poorer section of the society. For example, imposing a tax on kerosene which is considered a poor person's fuel may be regressive in nature, as this would increase the per unit cost of using the fuel, therefore leading to a change to traditional fuels like firewood and, thereby impacting the health of the households and the environment (movement downward in the energy ladder- from ladder two to ladder one).

The type of policy interventions in terms of energy pricing has to be selective and done after reviewing the impact on the poor. Higher taxes on fuels/energy generally used by the upper income class can be imposed (like petrol tax): increasing fuel costs are inflationary in nature and the poor are the worst affected.

One of the ways to mitigate the regressive impact on the poor is to couple it with some kind of subsidies. Subsidies have to be effectively targeted. Else it may lead to various types of perverse impacts. Subsidies can be of various forms, a consumption subsidy, for example a low charge for very low levels of household electricity consumption, or providing supply of some of the major poor household fuels through public distribution system, etc. The other type of subsidy could be in the form of cross subsidies- where one group of consumers is charged a price below the cost of production and other consumers compensate the shortfall. In this case the type of activity for which the energy is used, can be a deciding factor- the income class of the end consumers can be the deciding factor in this case.

Deregulating the energy service industry and encouraging private sector participation

The magnitude of investments that is required in the energy sector is huge. Financing these investments through public borrowing or direct budget transfer can lead to immense pressure on the exchequer and therefore on the fiscal stability. To meet effective demand of energy services both for the poor and the non poor it is essential to involve public, private and community based service providers. This diversity leads to effective service delivery and also fosters healthy competition, leading to decrease in the supply cost. These measures are ultimately going to benefit the poor more as the marginal utility of a unit of energy is much more for the poor than to the rich.

Recent experience in the industrialised countries and also in the developing countries have shown that creating a competitive environment for energy supply network leads to expansion of services besides making it cost effective. In addition, new technologies have created options for using lower cost, smaller scale generation and a broader range of offgrid supply options. Therefore, deregulation of the energy sector will enable growth of competition, thereby decreasing the costs of supply and also increasing the coverage factor.

Besides allowing private sector participation, policies in the energy sector should also provide effectively designed incentives (like capital cost subsidy, tax benefits etc) to invest in the rural areas[14].

Improve sector governance and regulation

Poor performance undermines the performance of existing sector enterprises and leads to negative externalities that impact the poor. Deteriorating performance of the energy sector can be attributed to three major factors- adverse movements in exogenous factors like rising world price of oil, inflation, high domestic rate of interest etc., inappropriate national policies on energy pricing and investments, and specific governance – enterprise related national policies on energy pricing and investments.

The second and third factors call for major governance and regulatory related interventions. Some of the policy interventions that would help in improving the negative externalities are:

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[14] Policies for promoting sustainable resource exploitation and management should also be a vital policy objective, as overexploitation of resources leads to immense negative externalities, thereby affecting overall growth.

a) Effective consumer pricing policies coupled with well targeted subsidies and delivery mechanism

b) Deregulating the energy sector, by allowing private sector participation, thereby increasing the efficiency through competition

c) An effective regulatory mechanism that leads to transparency and consistency in pricing and investment policy and service levels

d) Promoting participatory method of programme design and implementation for maximum impact

Reduce health and environmental costs

The majority of the poor in the developing countries depend upon traditional fuels for meeting their basic needs- cooking, lighting etc. the major traditional fuels used are wood, charcoal, dung and straw- the use of these leads to high level of exposure to combustion by-products, particularly dust and soot. These pollutants affect the health, life expectancy, and quality of life. The women and the children pay the most in this process[15]. All across the developing countries health damages from air pollution are very high, and the effects are particularly significant in the south Asia and sub Saharan Africa. World Health Organisation estimates that 2.8 million people die each year as a result of indoor air pollution.

Interventions to reduce the indoor air pollution arising from use of traditional fuels can be extremely cost effective in their benefits to public health if right mixes of policies are in place. Promoting the use of renewable energy especially in the rural areas is one of the most cost-effective methods of mitigating this impact. The next section reviews the type of costs and benefits that the promotion of renewable energy would lead to and the specific policy intervention that would be required to make this feasible.

To sum up, correct and effectively designed policy interventions can lead to considerable impact on the poor. Table 3.2 summarises the major policy interventions in the energy sector emerging from the discussions above and how they would impact the broader goals of energy development.

[15] See chapter 2 for the relationship between use of traditional energy and impacts on the poor and also for the environmental impact of traditional fuel use.

Table 3.2 *Impact mapping of policies and programmes against development goals*

Policies and programme	Energy development goals				
	1	2	3	4	5
Consumer pricing policies	High		High	Moderate	
Subsidy targeting and delivery mechanism	High		Moderate	Moderate	
Easing first cost constraints	High	High			Moderate
Encouraging community participation	High	High		High	
Deregulating the energy sector	Moderate	Moderate	High	High	
Private participation in energy service	High	High	High	High	
Rural electrification programme	High	High		High	
Natural gas development and management			High		High
Natural resource exploitation and management					
Mitigating health effects of biomass use					High

Where the goals are

1 Expand access to modern energy systems
2. Improve energy system
3. Ensure fiscal stability
4. Improve governance and regulation
5 Reduce health and environmental costs

Policies for promotion of renewable energy systems

Socio-economic development needs of the rural areas of developing countries are often very high, and therefore, would require commensurate efforts to reduce the costs of energy and increase the dependability of supply. The earlier sections illustrated how even though energy is often accessible, but is seldom affordable. In our field survey[16], the relationship between poverty reduction and an accessible and affordable energy infrastructure emerged very strongly.

Rural inequity and poverty have their roots in the conditions of landless, subsistence agriculture, and age old class structure. This is also true in the case of energy sector development. The industrial, commercial and transport sectors are organised and capable of evaluating and negotiating their energy needs with the energy supply agencies and planners. This is not the case with the poor section of the society. Moreover, besides the increasing burden of poverty, detoriating environmental conditions affect the poor adversely. For example, the increasing dependence on fuelwood for cooking has led to deforestation problems.

It is now widely accepted that technologies based on the use of renewable energy resources have a high potential in improving the economic conditions of the poor sector (particularly the rural sector) in the developing countries. Enhancement of renewable energy sources is a must to meet the projected energy requirements, owing to the availability of resources (fossil fuel) and environmental reasons. Table 3.3 below gives an overview of the major renewable technology and the various end users with the potential for implementation. Within each general application there are specific technologies that should be identified and evaluated according to their suitability for any type of development programme. In the commercial and domestic sector, renewable energy can play a greater role in terms of solar water heating system to meet the hot water demand, and solar photovoltaic to meet the electricity demand.

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[16] See Annexure 1

Table 3.3 Renewable Energy technology in development programme

	Agriculture	Household	Rural industry	Commercial and services
Photovoltaics	Pumping Lighting Cooling grinding	Community battery Recharging for household use	Lighting Cooling Electricity	Pre-electrification telecommunications
Solar drying	Crop preservation	Food preservation	Tobacco Timber Coffee Tea	
Solar water heating	Dairy Poultry	Bathing cooking	Textile Process heat	Clinics Schools
Wind pumping	Irrigation Grinding Mechanical power	Household water	Process water and mechanical power	Rural water supply Clinics
Cookstoves		Cooking		Clinics Schools
Biomass fermentation	Fertiliser Electricity	Cooking Lighting	Electricity Heating	Cooking Electricity
Biofuel combustion	Electricity Crop drying	Cooking Heating	Electricity	Electricity steam, process heat

Source. Bhaghavan, et al (ed), Energy for rural development, 1992

Greater reliance on renewable energy sources, and the use of cleaner technologies in the case of those based on fossil fuels could have enormous economic, social, and environmental benefits for India. Box 3.1 below illustrates a success study of rural energy programme that was undertaken by TERI.

Box 3.1 Dhanwas. A learning ground (Tata Energy Research Institute, Delhi, India)

Main aim: to provide sustainable energy options for the villagers of Dhanwas (in the state of Haryana, India) using renewable sources of energy

The main technologies that TERI was involved in can be classified into the followings·

- Technologies that were developed/modified/refined and disseminated (e.g TERI model biogas plant and improved cookstoves). The villagers willingly accepted these.
- Technologies that were experimented with but could not be disseminated due to the high costs and unsuitability of local conditions
- Technologies that were field tested and R &D is going on

Major learning

- Rural energy problems are location specific and hence uniform solutions are not feasible
- Socio-economic diversities have to be considered while designing the programme
- Institutional mechanisms have to be set in place for long term sustainability of rural energy programmes
- Energy can be a means of development, but not the end in itself

TERI, (2000), Rural Energy Matter

However, a host of barriers limit the introduction and deployment of these resources and technologies. Box 3.2 outlines some of the major hindrances to the development of renewable energy.

Box 3.2 Barriers for development of the renewable energy sector

- Limited infrastructure
- Lack of adequate production scale
- Information barriers
- Risk
- Lack of attractive financing
- Pricing barriers
- Technical barriers
- Regulatory and fiscal barriers

Policy reform and action are needed at all levels–international, national, regional, and local–to overcome these pervasive barriers. Policies should be tailored to the conditions and political realities in each country and market. For example, some countries will favour tax and incentive approaches whereas others would favour regulatory approaches. Policies should be combined and integrated into market transformation strategies, addressing the needs for both 'technology push' and 'demand pull'. Moreover, policies should evolve over time as some barriers are overcome and others became more prominent.

While national policies and programmes are the foundations of successful market transformation, the participation of state and local authorities and action at the regional and locals level can be critical to the success of national policies and programmes. Likewise, such international agencies as GEF (Global Environmental Facility) and other multilateral agencies can play a key role in financing national efforts, as well as in supporting capacity-and-institution building. International co-operation should be expanded where appropriate.

Finally, the private sector should be involved in policy development since it plays a key role in its implementation. Private sector's co-operation can determine whether or not a policy (or a set of policies) succeeds. While some companies have a vested interest in maintaining an inefficient and carbon-intensive energy future, other companies are actively developing, producing, or investing in high-efficiency renewable source of energy. Policy-makers can work with these innovative companies to develop and implement progressive policies and programmes that will lead to a more sustainable energy future.

4

Framework for poverty reduction strategy

ADB's energy sector policy

Energy policies of the Asian Development Bank evolved considerably over the period: its policies of 1981 responded to the oil crisis by emphasising supply augmentation in member countries, focussing on creating energy infrastructure, addressing environmental and social impacts of new projects, mitigating pollution from existing facilities, etc.

From the decades of 1980s onwards, governments in many countries had recognized the need for reassessment of the performance of infrastructure sectors hitherto considered to be in the exclusive domain of monopoly service providers. This exercise led to the belief that market forces and competition can improve production and delivery of the infrastructure services. Certain factors also hastened the process of introduction of commercialisation and privatisation of infrastructure services in these countries. These are: need for additional resources for financing the infrastructure sectors, the government's inability to supply infrastructure services in efficient and commercially sound manner, the provisioning of efficient and cost effective infrastructure services enabling countries to compete globally and technological breakthroughs leading to management of infrastructure services through competition. Despite scope of such competition, the market structure in infrastructure services retained a monopolistic element in most countries Governments in these countries had to continue to protect consumer interests and at the same time, they had to provide a level playing field and conditions for fair returns for new investors. Also high transaction costs due to privatisation process had to be mitigated. Since government in many countries continued to be one of the stakeholders, it was natural that there should be an outside regulator, maintaining an arms length relationship with all service providers and stakeholders, including the Government. These considerations provided the rationale for a new type of regulation, often called independent regulation, in most countries.

Responding to this, the energy policy of 1995 emphasized the need for creating an enabling environment for additional private investment in energy sector by establishment of independent regulators specially for insulating the tariff decision away from the political executives. It also called for adopting measures for improving energy efficiency and demand side management, and addressing environmental issues both at the local and national level. In particular, emphasis was given to those DMCs willing to undertake restructuring in the energy sector for improving efficiency and for attracting private sector participation in the sector. It also encouraged private projects or joint venture projects in the DMCs, emphasized the need for improving energy efficiency both at the supply side as well as demand side, laid emphasis on the environmental protection at all stages of the project cycle, catalised proactive steps in development and utilisation of natural resources, promotion of regional trade in energy, and encouraged approaches for better rural energy supply and regional trade in energy. The policy also called for a move towards adoption of market forces for price determination of the energy products, and encouraged elimination of subsidies/ cross subsidies in the determination of prices of such products.

During 1995-1999, ADB approved 40 loans totalling $4.83 billion in the energy sector, which is significantly lower than those for the period 1967-1994 (see Table 4.1)

Table 4.1 Past energy sector operations of ADB:1967-1994 and 1995-1999

Item	1967-94		1995-99	
	Number	Amount (in $)	Number	Amount(in $)
Loans, total ADB	1288	51 2 b	364	31.19b
Loans energy sector	231	12 68b	40	4 83b
Share of energy sector	17 9 %	24 8%	11%	15 5%
TA operations, Total ADB	2789	970.5m	1439	811.1m
TA operations, energy sector	317	101 3m	141	74.10
Share of energy sector	11.4%	10.4%	9 8%	9.4%

This decrease in energy assistance can be mainly contributed to (i) shift in ADB assistance to the financial and social sectors in the crisis affected DMC's (ii) due to uncertainties arising from such crisis and (iii) an increasing involvement of the private sector in the region.

Given the increasing importance of the theme of "poverty eradication/ implementation" in the international development agenda, ADB has also, as stated earlier, adopted poverty reduction as its overarching goal. This would call for reorienting the energy sector policy of the ADB towards realisation of the objectives of poverty eradication.

This chapter reviews and assesses the existing poverty reduction strategy of the Bank in detail within the scope of energy sector projects. It also recommends alternate strategies to make the Bank's energy sector services that fit into the overarching goal of poverty eradication.

ADB's poverty reduction strategy

Although started as a growth oriented development organisation, the Bank started shifting its focus slowly towards social and environmental concerns. The bank adopted poverty reduction as one of its five strategic development objectives in its first medium term strategic framework 1992-1995 (March 1992).

Since 1992 till 1998, the Bank has approved 123 projects with poverty reduction as primary or secondary strategy development objectives. Reduction of poverty as measured against parameters such as well being, access to resources, knowledge, and rights, is no longer one of the objectives of the Bank, buts now its over-arching goal. In fact, other strategic objectives such as economic growth, human development, environmental management, gender development, would be pursued in a way so that these contribute to poverty reduction in an effective manner. The Poverty Reduction Strategy in 1999 recognised that " poverty is a deprivation of essential assets and opportunities to which every human is entitled. Everyone should have access to basic education, and primary health services. Poor households have a right to sustain themselves by their labour and be reasonably rewarded, as well as have some protection from external shocks Beyond income and services, individuals and societies are poor- and tend to remain so – if they are not empowered to participate in making decisions that shapes their lives." All the ADB's public sector loans are now expected to contribute to the overarching objectives of poverty reduction through three key pillars for poverty reduction. These are (a) pro-poor sustainable growth, (b) social development and (c) governance.

With poverty being charecterised by four dimensions: material deprivation-deprivation of basic needs (measured by an appropriate concept of income or consumption), poor quality of life (low achievements in health and education), vulnerability or exposure to risk (vulnerable to adverse shocks, linked with the inability to cope with them) and a sense of voicelessness and powerlessness in the institution of state and civil society[17], the role of energy sector can be vital. However, the link between energy and poverty alleviation is less well understand, due to the many indirect and (therefore often not so obvious) relationships between the two. That access to better and cheaper energy services improves the welfare of the poor seems obvious. The energy ladder explained in chapter 3 illustrates that energy security in the poorer households will lead to not only an improved quality of life, but will also ensure lesser degree of vulnerability. Therefore, given ADB's overarching aim of poverty reduction, the energy sector projects of ADB would have to be so designed that they effectively contribute to poverty reduction.

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[17] See chapter 3 for more details on poverty

Review of existing ADB guidelines on poverty impact analysis

Poverty reduction requires united efforts by government and the civil society and more importantly a strong and sustained support from the international community. The ADB views the twin pillars of pro poor, sustainable economic growth and social development as the key requirements for any attempts to poverty reduction. It also realises the important nexus between poverty and environment. Within this broader framework, ADB divides the poverty reduction strategies into short term- that sustain the supply of basic needs of the poor during emergency, medium term that helps in addressing structural issues affecting delivery of basic services and other targeted poverty reduction interventions and long term interventions that stimulate pro poor growth and encourage expansion of the private sector (For details see Chapter 3).

With the main focus on medium and long term interventions, ADB has based its entire framework of poverty reduction strategy on the three pillars explained below in details.

The pillars of poverty reduction strategy

The pro-poor sustainable economic growth pillar of the Poverty Reduction Strategy is based on the assumption that growth can reduce poverty by generating employment and incomes, and labour intensive growth can reduce it even faster. Policies supporting such measures should be able to address the following issues:

(a) Removing market distorting interventions such as reliance on state owned enterprises.

(b) Promoting conducive environment for the private sector, which should be aimed at increasing employment and income generating opportunities for women and other groups that may be outside of the formal labor force.

(c) Promoting sound macro economic management.

(d) Requiring special interventions to enable rural poor and urban unemployed with access to key services and opportunities for self employment so that fruits of market driven growth reach to them.

(e) Encouraging regional and sub regional co-operation which offers larger markets, economies of scale, and division of labour.
(f) Addressing environmental issues for sustainable economic growth.

The second pillar of the Poverty Reduction Strategy is Social Development, which would require policies that ensure:
(a) Adequate budgetary allocations for human capital, targeting basic social services to the poor,
(b) Removal of gender discrimination,
(c) Effective population policy and social protection.

The third pillar namely Governance would enable creating an environment that would facilitate participatory pro-poor and accountable policies as well as sound macro economic management.

To ensure that all aspects of ADB operations are driven by poverty considerations, ADB has developed a comprehensive strategy to translate the above framework into practice. The main components of the strategy are:

Macro level poverty analysis

A comprehensive examinations of the constraints and opportunities for poverty reduction in each country have been undertaken to review the sector poverty targets agreed under the strategy 21 (Appendix 1) and the agenda for action on social development and the principal sector strategies are being formulated.

Micro level validation

Field studies should be undertaken to disaggregate the poor into those in the mainstream, and those excluded by geographic or social factors. Participatory assessments and consultations are required to be held with the civil society to provide a more accurate picture of the status of basic services and poverty in the region. Through these process ADB would be able to use their resources to support the programme of the government.

Given ADB's overarching goal of poverty reduction, all loans (including programme loans) and technical assistance are expected to contribute to the reduction of poverty. Each component of the operational cycle (see Figure 1) is expected to contribute to the poverty impacts.

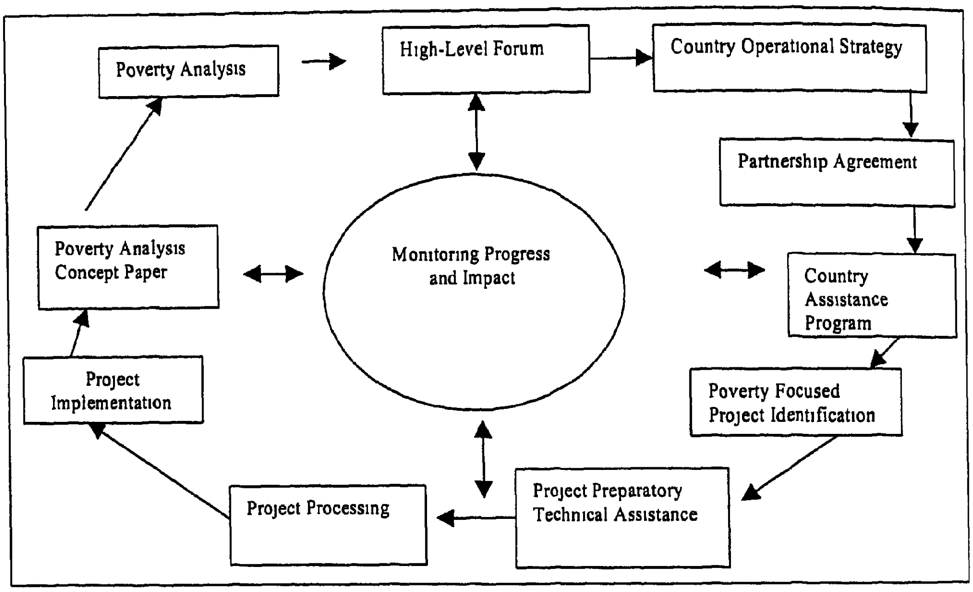
Poverty Analysis
High-Level Forum
Country Operational Strategy
Partnership Agreement
Poverty Analysis Concept Paper
Monitoring Progress and Impact
Country Assistance Program
Project Implementation
Poverty Focused Project Identification
Project Processing
Project Preparatory Technical Assistance

Figure 4.1: Project cycle

Country strategies

The high level forum organised at the first stage of the operational cycle would discuss the findings of the above process among various stakeholders like the government, the NGOs, community based organisations and the private sector so as to finalise the activities that would have the most impact on poverty eradication.

Based on the discussions in the high level forum, the country operational strategies are being developed. The strategies provide analysis and area of focus, including policy reforms and sectoral emphasis. Then a partnership agreement between the government and the ADB would be finalised to endorse the country operational strategy. The country assistance plan would then translates the underlying objectives of the partnership agreement into more specific activities. The plans prepared annually would identify the programme of loans and assistance for each borrowing country.

Project typology

To establish the contribution of ADBs operations to the overarching objectives, the justification for each loan is required to be explained as to how the activities covered under each loan will address the poverty issue.
Therefore all loans (for projects/programmes) are divided into poverty intervention projects (PI) and other thematic projects (other than PI) Whereas the poverty intervention projects would have clear poverty reduction impacts, in the latter case, the impacts may not be immediately obvious.[18] All loans processed for approval in 2001 onwards satisfying the following criteria must be classified as PI including core poverty interventions (CPI):

1. Proportion of poor among the beneficiaries should be disproportionately higher,
2. Impact analysis of benefits should benefit the poor more,

All other interventions (non- poverty) should also present a qualitative explanation (at least) of how they indirectly impact the poverty reduction strategy.

Besides the poverty classification mentioned above, all interventions also focuses on one or other thematic priorities - economic growth, human development, gender and development, good governance, environmental protection, private sector development and regional cooperation. All loans are pre-classified at the programming stage, and later verified at the loan processing stage. Loans that have been pre-classified as poverty interventions require data and information to undertake both qualitative and quantitative analysis to justify their classification status.

Existing methodology for measuring Poverty Impact of energy projects

In this section, we review the existing guidelines of ADB on poverty reduction strategy. We also present two case studies to illustrate the existing methodology. Based on the analysis, alternatives models of poverty reduction analysis has been suggested.

Distribution analysis

ADB's guidelines for the Economic Analysis of projects 1997(Appendix 25) outline the detail procedure for the calculation of distributional analysis of a Bank project. This flows from the calculation of financial and economic analysis of the project. The difference between economic value and project's financial value has to be distributed various stakeholders. The calculation of the net income changes for the economy in net present value terms, is based on the assumption that if there is a cost item with net positive economic value over its financial value, somebody would lose an income greater than that captured by its financial value, while if there is an output with economic value greater than its selling price, there is an income gain to the economy, which has not been captured in the financial analysis. Thus, the distribution analysis would require the task manger to calculate the winners and losers first from the a) financial transactions of the project, and b) thereafter, from difference between the economic and financial prices.

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[18] Loan classification system conforming to the poverty reduction strategy, Asian development bank, October 2000

Poverty impact analysis

Appendix 26 of the Bank's Economic Analysis of the project 1997 lays down the procedure for the PIA (Poverty Impact Analysis). The proposed Handbook for Poverty Impact Analysis of Projects of August 2000 clearly stipulates disaggregating winners and losers arrived at during the distribution analysis of the projects, into poor and non-poor categories. Thus, it primarily relies on income based definition of poverty. In a Study in Transport sector (Hansen May 2000), dealing on the subject, the following was observed:

- The PIR (poverty impact ratio) could be a misleading indicator of poverty reduction impact. It is easy to design real world cases where PIR increases significantly, as the overall benefits to the poor is reduced. Thus, PIR is an indicator to be used with utmost caution and never as the only indicator of poverty impact.
- Assessing the economic value to the poor when there is no charge, or the goods or services are offered at highly subsidised price, requires an estimate of resource cost savings on alternative sources. Where this cannot be done in a satisfactory manner, a head count should be supplemented.

The distribution analysis would show widely different incidence of project's poverty impacts for different discount rates[19], and there is no correct answer about which is the correct discount rate. Calculations based on different discount rates may be carried for examining the sensitivity of poverty impact to discount rate variations.

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[19] Discount rates vary among different target groups effected by the projects private sector participation has a higher discount rate than the government due to different rate perception.

We now examine the approach adopted by the IEEN in calculation of the poverty impact analysis in some of its projects. So far, the thinking in the Division is that if a project is growth oriented or a project with poverty interventions as its primary objectives, then, the distribution analysis and poverty impact analysis have to be carried out at the RRP (Report and Recommendations to the President) stage. In contrast, if a project is an environment project (say wind power project), there is no need to calculate the PIR on the ground that an environment project need not stand the test of having poverty reduction impact per se, as the relevant project via its positive environmental impact is expected to reduce the poverty. In fact, it has been established beyond doubt that environment degradation (for details see chapter 2) disproportionately affects poor especially, women and children. We examine some of the issues in the following sections.

Case 1: Power transmission interconnection and reinforcement project in Philippines (RRP May 2000)

The net financial benefit showed a loss of P 889 million in its present value, while the net economic value of the project at the domestic price level is estimated as P 6676 million. The difference of P 7565 between the net economic benefit and net financial benefit has been distributed among groups. It comprises of consumer surplus of P 2258 million (mainly in terms of the difference between without project-cost of electricity and with-project expenditure on electricity plus the value of electricity consumed but not paid for), difference between financial and economic costs of capital investment and operating costs of P980 million and P3796 million respectively (mainly due to government tax and duties, over valuation of exchange rates and other price distortions), and benefit to the labour of P531 million (wages less opportunity costs of labour). Two participants gain namely labour at the project wage level, and electricity consumers gaining out of the consumer surplus. Investor NPC (National Power Corporation) loses at a discount rate of 12 percent. As NPC is a government owned utility, its losses can be approximated as government's losses from investment in the project. If one adds this to the tax and other price distortions, government's gain will be P 3887 million.

For the purpose of apportioning such gain/losses among the poor and non poor, the RRP adopted the following methodology:

- Mindanao in Philippines is covered under the project benefits. About 62 percent of poor in the area does not have access to electricity. Based on the projected shares of the poor consumers, their electricity consumption and the number of poor living below the poverty line, the RRP took 25 percent as the share of consumer surplus going to the poor, and calculated the benefit going to the poor accordingly.

- In Philippines, 36.7 percent population live below the official poverty line. Thus, the analysis assumed that 36.7 percent returns accruing to the government would be passed on to the poor.
- Based on the rural labor employed at the project site, the analysis assumed that 20 percent surplus for labour would go to the poor.

A combination of the above formulations resulted in the projection of 28 percent of net economic benefits going to the poor, and the PIR (poverty impact ratio) is 28 percent. In addition, the projects' non income benefits has been stated to flow in from the project.

Case 2: Power rehabilitation project in Tajikistan

The RRP calculated the net economic benefits over financial benefits at $ 51.27 million, and distributed the same among consumers, government and labour. The disaggregation of these benefits between poor and non-poor has been calculated on the basis of the following assumptions:

- Incremental electricity in the project areas will benefit the poor more than non poor, as their consumption is projected to increase faster because of their current lower electricity consumption level and lower electricity tariff compared to the alternative energy costs (confirmed through the *Participatory field study*).
- Based on the share of the poor consumers, their electricity consumption pattern, and number below poverty line, it has been estimated that 59 percent of the consumer surplus would go to the poor.
- In Tajikistan, 83 percent of the population live below the official poverty line. It has been assumed that benefits to the government will be equally distributed and 83 percent of the return to the government would go to the poor. 70 percent of the labour benefits would go to the poor.

Certain conclusions can be drawn from the above cases: that the percentage share of the poor in net government benefits pegged at official head count ratio of power by index, may not be the right way of calculation of government's share, that the assumption that poor will receive the benefits accruing out of the project, for instance, in accessing to electricity (as in case 1), may be too simplistic unless certain additional measures are undertaken to ensure such accessibility, and that the indirect benefits may be quite high, but, is difficult to calculate under the method.

The Bank's proposed handbook (August 2000) on the subject have indicated considered an alternative way in calculation of poor's share in government's net income benefits. It quoted a study (N Kakwani 2000) for arriving at the share by using the following formula:

$$Yp=\{(1-PG)*PL*POP*HC\}/GDP*POP$$

Where Yp is the income share for the poor, PG the poverty gap[20] percentage, PL the poverty line annual income per capita, POP total population, HC head count percentage, and GDP is GDP per capita. Assuming that HC=0.367, PG=0.13, GDP per capita=P 23184 (1998), POP=75.2 million (1998), PL= 10284 per year (1998), the poor's income share in net government benefits in Philippines, has been calculated at 14 percent. If one takes this share, then, in Case1, *the PIR comes to less than 17 percent!*

This shows that the PIR is very sensitive to the poor's income share percentage in Case 1, while it may not be very sensitive in Case 2, as the latter has very small net government benefits. In any case, conceptually, it is difficult to assess the impact on the poor, which would depend on the proportion of marginal expenditure that goes as benefit to the poor, and empirically, it is difficult to assess. As an approximation, it is suggested that the government budget documents could be examined to find out the expected impact of the project benefits, and their allocation to poor. This share may be taken for calculating the poor's share in the net government benefits.

To conclude, the existing guidelines of the Bank on poverty impact assessment still need to be refined so as to ensure that there is maximum impact on the poor. As has been explained earlier (and also endorsed by another study done by the Bank), the poverty impact ratio is not a complete indicator of the impact that energy projects have on the poor. Moreover, given the nature of the energy projects, (contributing more to economic development and environmental improvement), the existing guidelines are not sufficient, and sometimes it becomes very difficult to estimate the impact on the poor. In the sections below, we propose a set of methodologies that should be incorporated at each stage of the project cycle so as to ensure that there is maximum impact of the energy projects on the poor.

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[20] The headcount ratio of poverty incidence is the crudest and incapable of capturing any deterioration of income of those already in poverty The poverty gap index (expressed in percentage) estimates the depth of poverty in the population as measured by the average distance below the poverty line, expressed as a proportion of that line.

Alternate methodology proposed for ex ante analysis of impact on poverty reduction

A review of the type of energy projects funded by the ADB shows that broadly they can be classified in the following categories (See table 4.2).

Table 4.2 Types of energy projects funded by ADB

Category	Type of energy projects
Generation	Thermal
	Hydro
Transmission	Thermal
	Hydro
Distribution	Rural electrification
	Renewable energy projects
Other projects	Energy and environment projects

For each type of classification, the methodology to study the impact on poverty will be different. For example, in case of a power transmission project, using a headcount ratio may be difficult, as the final project beneficiaries are hard to define. However it is evident (studies have also indicated) that power sector development has its trickle down impacts- direct as well as indirect benefits. In the case of rural electrification programme on the other hand, final project beneficiaries are identifiable, and therefore a headcount measure can be used to carry out an ex-ante impact analysis on poverty.

In the sections below, we propose a set of techniques that could be selectively used as per the project classification type. Table 4.3 below summarises the techniques project wise. Detail explanations of the same are followed in the sections below.

Table 4.3. Poverty reduction strategies

Project type	Objective tree/ cause and effect analysis	Benchmarking exercise	Poverty impact ratio	Macro level impact analysis	Micro level (household level impact analysis
Generation projects	✓	✓	✓	✓	
Transmission projects	✓	✓	✓	✓	
Distribution projects	✓	✓	✓		✓
Energy- environment project	✓	✓		✓*	✓*
Programme loans	✓	✓		✓*	

* in this case a macro level qualitative analysis of with and without scenario can be undertaken

Objective tree and cause and effect analysis

All the energy project should at the start of the project operation cycle prepare an objective tree detailing out the primary and secondary objectives of the project and how the project will address the issue of poverty reduction. To construct a rational and more realistic objective tree, 'cause effect' analysis should also be carried out. The cause effect analysis should be able to identify the major cause of poverty in the area and how development of energy sector fits in as one of the solutions. It should be able to identify clearly the links between energy and poverty reduction so as to enable a pro- poor designing of the project.

In this context, a participatory study to assess the links between poverty and energy in the area should be made mandatory. This study could be undertaken during the high level forum stage of the project operational cycle (see Figure 4.1). One such study that is recommended is the Tajikistan study (power and poverty in Tajikistan) undertaken by ADB. Appendix V lists the draft questionnaire that was used by the Ministry of Non Conventional energy in the Philippines to undertake a energy demand and supply estimate study. Information on similar lines could be used. The type of information that should be collected can be on similar lines. The Appendix 3a and 3b illustrate an example of how an objective tree and cause effect analysis exercise should be.

Benchmarking projects for ensuring poverty reduction

In order to evaluate the ADB energy projects from the poverty alleviation perspective at the RRP stage, certain benchmarks or criteria could be used to assess whether the project has been effectively designed to cater to poverty reduction objectives. An early step in a framework towards securing relevance and efficacy in the project cycle of poverty oriented projects is to secure what the World Bank terms as " Quality Assessment Entry (QAE)". This framework has also been recommended by another study done on transport by the ADB (Framework in measuring poverty impact of transport projects, May 2000). Listed below is a set of criteria against which all projects should be assessed. This exercise would help identify the weaknesses and shortcoming in the project design and refine it so as to suit the objective of poverty reduction.

However, the very nature of power transmission and generation projects are such that these benefits are difficult to establish, as the end point consumption source is most often not known For analysing the impacts of such projects, we propose a macro level analysis framework to establish the per unit value addition in various sectors that could be attributed to such projects. This analysis is an attempt to establish the expected contribution of such projects on poverty reduction at the broad level, and can be implicitly assumed to be the general impact of the project.

Benchmarking criteria

1. Has the project prepared an objective tree and a cause and effect analysis (to draw on the evidence and address the causes of poverty)?
2. Has the project addressed the issue of poverty alleviation in the selection and design of project site?
3. Has a participatory assessment exercise been carried out in the project area?
4. Is the project linked to poverty focused policy reforms and institution building?
5. Has it been ensured in the project design that the project will not have any negative impact on the poor?
6. Does project background data establish the extent to which the situation of the poor and the target group in particular can be assessed[21]?
7. Has a poverty impact assessment exercise carried out for the project subject to norms as indicated in Table 4.3?

Each project should be checked against the benchmarks mentioned above and a scoring exercise can be undertaken, where a score of 1 = unsatisfactory, 2 = marginally satisfactory, 3= satisfactory, 4= good practice. Table 4.4 below illustrates an example of an exercise undertaken for the five case studies of IEEN projects which have been analysed in details in the following chapter. Appendix IV explains the basis of the score that have been assigned to each of the project.

Table 4.4 Benchmark assessment by country: IEEN projects

Country	Year	Loan #	Bm 1	Bm 2	Bm3	Bm4	Bm5	Bm6	Bm7	Score
Philippines	2000	PHI OCR	2	2	1	2	1	2	3	1 85
Philippines	2000	1042-PHI	1	4	1	3	1	1	3	2.00
China	2000	PRC-2000	2	2	1	1	2	2	1	1 57
Tajikistan	2000	TAJ 2000	4	4	4	4	4	3	4	3.86
Indonesia	1999	INO 31604	3	2	1	2	3	1	NA	2 00
Average			2 5	2.8	1.6	2.4	2.2	1.8	2.6	

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[21] For example in the Tajikistan study provision was included to collect and monitor data on some variables like number of houses electrified, cost of connection etc

The table shows that except for the Tajikistan study all the other projects does not even score satisfactory in-terms of whether the project caters to the poverty reduction objectives. Also, it is obvious from the above table that benchmark 3 and 6 scores the least, which shows that the concept of participatory assessment and maintaining database is mostly neglected during project design. This exercise can also help determine the lacunae, and thereby, the steps that have to be taken so as to refine the project to cater to poverty reduction.

Distribution analysis and the poverty impact ratio

The economic and financial analysis of all projects (Appendix 25 and 26) should be carried out as is being normally done. In any Bank's project, while undertaking the distributional analysis for the poverty impact ratio exercise, certain refinement has to be incorporated. Earlier, it is suggested that the government budget documents could be examined to find out the expected impact of the project benefits, and their allocation to poor. This share may be taken for calculating the share of the poor in the net government benefits. For example in the case of India, government budget document shows the share for the allocation of funds to poverty reduction specific schemes by each ministry (for example, the allocation to programmes like Jawahar Rojgar yojana, Rural Literacy and employment generation programme, food for work programme, employment assurance schemes etc- programmes that directly cater to the needs of the poor) in the total budget, and that can be assumed to be the percentage of total government revenue flowing to the poor[22].

Macro level poverty impact (value addition by the energy sector)

Most of the energy sector projects funded by the ADB relates to direct economic growth or environmental protection. Sometimes because of the very nature of the project scope, it is difficult to estimate the exact impact on the poor. The earlier chapters have established the fact that economic development has immense positive impact on poverty reduction. However, as most of the impacts are indirect and sometimes non- monetary in nature, accounting for the benefits, particularly the impact on the poor is difficult. For example, a power transmission project may have immense trickle down effects on the poor- in terms of incremental availability of electricity, which could be used for cooking and heating, therefore saving time and costs and indirectly help reduce the pressure on forest and also increase the productivity of household. The incremental electricity could further be used for irrigation, thereby generating seasonal employment and income from the sale of the agriculture produce, in-act, a hydro power project may have additional benefits for the agriculture sector as it ensures both incremental water availability as well as increased water availability in the project area. The increased and reliable supply of power can also lead to establishment of small-scale industries and have trickle down impacts in terms of employment generation. Therefore, it is obvious that a power transmission project has positive impacts on the economic well being of the poor.[23] For example, Figure 4.2 below explains how a power rehabilitation project can help in poverty reduction.

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[22] As an example, the Union budget for India (2000-01) allocation to the ministry of rural areas and employment (Rs 9760 crores), ministry of tribal affairs (Rs 210 crores), and the ministry of urban employment and poverty alleviation (Rs2567 crores) can be aggregated and the percentage share (in this case it is 11%) can be assumed to be government's spending for the poor

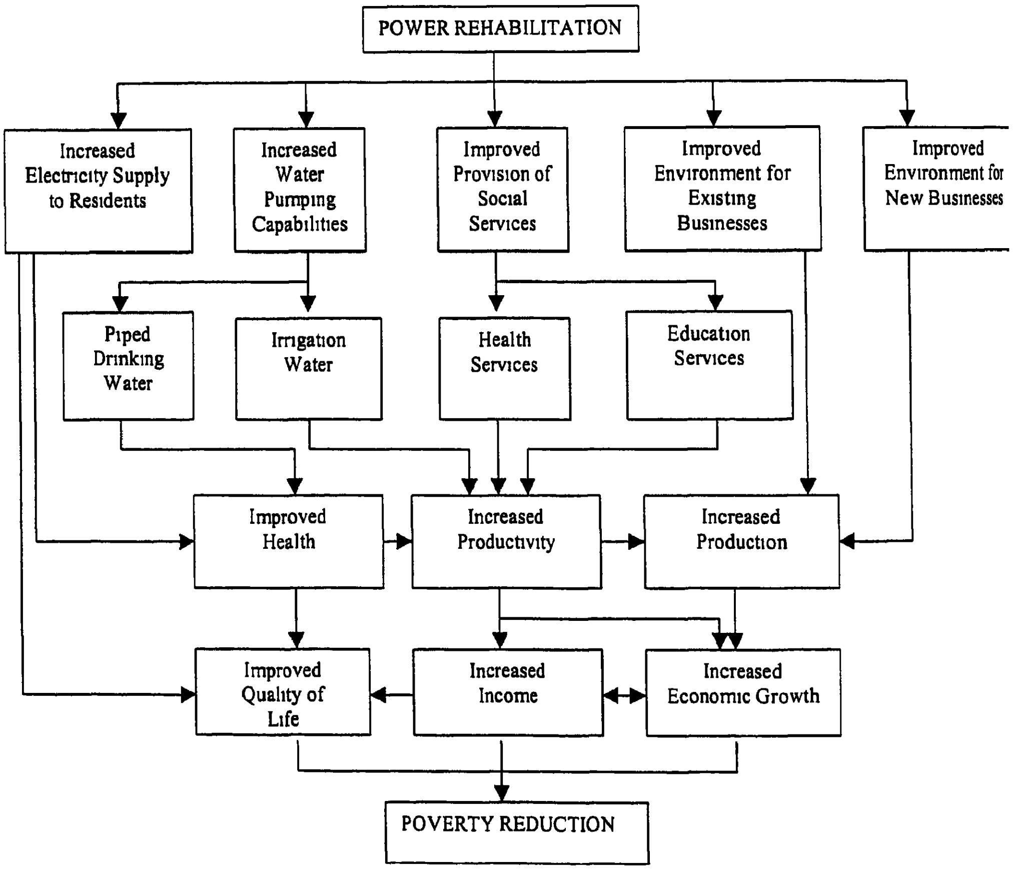
POWER REHABILITATION
Increased Electricity Supply to Residents
Increased Water Pumping Capabilities
Improved Provision of Social Services
Improved Environment for Existing Businesses
Improved Environment for New Businesses
Piped Drinking Water
Irrigation Water
Health Services
Education Services
Improved Health
Increased Productivity
Increased Production
Improved Quality of Life
Increased Income
Increased Economic Growth
POVERTY REDUCTION

Figure 4.2 Benefits of power rehabilitation project

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[23] It should be noted that energy projects have its negative impacts on the economic as well as social well-being of the people Therefore these negative impacts should be netted out from the total benefit to calculate the net benefit from the project

Main aim

To estimate the per unit value addition (impacts) in the various economic sectors through energy projects.

The impacts can be either in terms of:

- income
- employment
- increased quality of life.

To measure these impacts we present below a set of modules and the framework of analysis. The sections below outline the framework of analysis and the types of information that would be required for the same.

Value addition at the residential sector (Vr)

Households require energy first to meet some of the basic needs, and then as their income increases to access the facilities for a better quality of life. Energy is required to cook food, for majority of the poor households, this energy is often consumed in the form of firewood, straw, dung or other biomass. These have its own repercussion in-terms of negative impacts on health and increased pressure on forests. Energy is also needed to illuminate their immediate environment to function after dark, poor households often obtain this energy in the form of oil lamp, candles and dry cell batteries. In some countries, energy for heating the house is essential and a basic need.

Given these requirements, a power generation/transmission project will have some positive impacts. We present below the framework of analysis and the list of information required to carry out this analysis.

Value addition in the residential sector per unit of electricity generated can be defined as the costs of alternative fuel saved and the time and labour costs saved (particularly among the poorer classes)[24] due to the incremental power available. A list of information that will be required for estimating the above.

- Average effective energy consumption in the project area, broken into income categories- i.e. average effective energy consumption among the population falling below poverty line and above poverty line.

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[24] There are other impacts on the quality of life like more time for education etc which will result due to the availability of power in the residential sectors- these needs extensive data to be analysed

- Among the population categorised under below poverty line, a further reclassification can be done in terms of percentage share energy consumed for cooking and heating and lighting.
- Savings (incremental energy available for cooking, heating and lighting)
  - Cost incurred by the household on cooking and heating- in terms of wood[25], time spent in collection and cooking (can be valued by multiplying the time spent with the minimum/hour wage rate)
  - Cost incurred on alternative fuel used for lighting -could be diesel or kerosene
  - These two costs can be added up and based on the average energy consumption figure, per unit value addition can be estimated (V_{rs}).[26]

Value addition in the agriculture sector (Va)

Power in the agriculture sector is an important input for the development of this sector. Power in this sector is mainly used for irrigation, though it is also used for some processing machinery like threshers, tractors etc. Besides addressing the important issue of food security, the agriculture sector is also important as a source of employment generation, particularly in the developing countries. Also irrigation vitally influences the use of indirect energy (fertilisers), and also direct energy for tillage, crop care, harvesting and threshing because of the better care and higher yields of irrigated crops. Farm surveys conducted in India and also in other countries (Bhalla 1979, Singh and Miglani, 1976, Stout, 1979) shows that the bulk of fertilisers are used on irrigated lands. Irrigation influences crop pattern which in turn affects energy use. In northern India, irrigation has led to substantial increases in wheat and rice, which require more energy and produce higher value yields than traditional cereals and pulses. Studies have indicated that irrigated wheat required 294% more human labour than did unirrigated wheat.

There have been studies that have indicated a strong relation between energy, productivity and overall economic development (measured in terms of

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[25] In this case only wood is being considered because people below the poverty line would mostly use wood, however this may vary country-wise

[26] The information mentioned for estimating the value addition from the residential sector are available as secondary information For e g in the case of India, the national sample survey periodically carries out surveys (Called Rounds) which has information on number of people below the poverty line, the energy consumption pattern, the average amount of firewood used, the time spent for collecting fuelwood Also there are innumerable study that are done specifically on the same and the information from those can be used as an approximation for estimating the value from the residential sector

GDP). In fact a study done by TERI (India) on Cost of unserved energy (May 2000) reported that in the study area of Haryana (India),) 49% of those farmers who have electric pumpsets reported that they would gain if power were to be available for longer period. The study also reported that the average loss in production suffered by marginal farmers was lower than that suffered by large farmers, because of the subsistence farming done by the former. The average cost of production loss per unit of electricity not available decreases from small farmers (Rs 1.92 kWh) to medium farmers (Rs. 0.84 per kWh). This is more because as the size of landholding increases, the capacity to use alternative methods (buying water for irrigation or using diesel) increases during the critical period when the demand for irrigation is high. Therefore what the study illustrates is that as the small and the marginal farmers are more vulnerable to risks, the marginal utility of available power is more for them than for the richer section of the society. Interestingly the same study carried out in the state of Karnataka showed that the trend in percentage of production loss due to power cuts is higher among the small and marginal farmers. This is because all categories of farmers in Karnataka grows cash crops- and since almost all of them depend on electrical pumpsets, the losses due to power shortages are higher.

The value per unit of power consumed in the agriculture sector can therefore be defined in-terms of the marginal seasonal employment generated and the income from the sale of the marginal produce. To estimate the per unit value addition, the following information should be collected:

1. Total incremental power consumed by the agriculture sector.
2. Total area under agriculture in the area (crop wise break-up).
3. Per hectare of power consumed (total production per unit of land under agriculture).
4. Seasonal employment generated per hectare of agriculture land cultivated (Can be disaggregated into employment generated per hectare of area under agriculture- total seasonal employment generated by this sector total divided by the total area under agriculture).
5. Per hectare income generated from the sale of produce and from the seasonal employment produced (this can be disaggregated landholding wise-marginal landholders are assumed to belong to the poor category of the society).

6. Therefore total value generated per unit of power consumed (for the poor)[27] will be equal to the per hectare of employment and income generated.[28]

Value addition in the Industry sector (VI)

There are a number of major energy consuming industries found in most countries. Five or six of these countries often represent 60-70% of industrial sector energy consumption and a few factories may often use 80-90% of this energy. The following industries are typically found to be large consumers in most countries.

- Food processing (dairy products, baking, brewing, sugar)
- Materials of construction (Cement, bricks, lime, glass)
- Textiles
- Paper
- Ceramics
- Iron and Steel
- mining, non ferrous metal recovery and chemicals

Energy is consumed in the industry sector during the various stages of processing and also manufacturing. Therefore energy is one of the important inputs that goes into the industry sector. Industries have been known to generate economic development, thereby increasing the opportunity of employment and income, particularly for the poorer sections. In this context, the value addition in the industry sector per unit of energy consumed can be defined as the total employment and income generated for the casual labour category per unit of power consumed in a particular industry. In this context it should be noted that the output of the industrial sectors goes in as input into other sectors and thereby leading to further employment and income generation, for e.g. the coal used for power generation also as an industry generates income and employment opportunities. However, for this study, value addition at the first stage in itself is indicative of the type of value addition in the industry sector through the consumption of energy. The following information has to be collected to estimate the incremental value addition per unit of energy consumed in the industrial sector.

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[27] In the case of India, all the information required for estimating the value addition from the agriculture sector are available for the agriculture statistics (published by the ministry of statistics)and the fertiliser statistics(published by the fertiliser association of India)

[28] The estimated value addition is still not complete as output in this sector will be used as input into other sector and even this would generate income and therefore create value. Given the data constraints, we suggest a first level estimation only as it is quite indicative of the kind of value addition possible by promoting energy sector projects

1. Effective energy consumption in the industry sector (broken major industry wise).
2. Total average production in each type of industry.
3. Production per unit of energy consumed.
4. Number of casual labours employed per unit of production (and therefore per unit of income generated) and per unit of power consumed
5. Income per unit of production and per unit of power consumed[29]
6. Total value generated for the poor per unit of power consumed

Total value addition for the poor (V_{tv})
Therefore, total value addition of a power project can be estimated using the following equation:

$$V_{tv} = (PCR * V_r) + (PCA * V_a) + (PCI * V_I)$$

Where·
PCR is the percentage share of the residential sector in total power consumption in the area,
PCA is the percentage share of the agriculture sector in total power consumption in the area,
PCI is the percentage share of the industrial sector in total power consumed in the area,
V_r is the value generated of per unit of power consumption in the residential sector,
V_a is the value generated per unit of power consumed in the agriculture sector,
V_i is the value generated per unit power consumed in the industry sector.

Household level benefits

As discussed earlier, consumer surplus defined in the poverty impact analysis framework is an incomplete exercise, the Tajikistan exercise on participatory study on power and poverty supported the view that the provision of electricity will have substantial impact on reduction of poverty, and improve the quality of life in the area. In Tajikistan, heat is a basic need besides water, food, clothing and shelter. Aside from the high economic costs of using alternative fuel there are time, labor, health, social and gender impacts of the scarcity of electricity.

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[29] Information required for estimating value addition in the industry sector are available in the industrial statistics (published by the ministry of statistics) and the economic survey (by the Planning commission) as well as the CMIE(Centre for Monitoring Indian economy).

We noticed earlier that principal economic benefit of the project to the poor is increasing power supply to meet the incremental electricity demand, particularly due to the poor distribution system in war damaged area. The incremental electricity available in the area will benefit the poor more than the non poor as their consumption is expected to increase faster because of their current low electricity consumption level, and also lower electricity tariffs compared to the alternative energy costs.

The analysis of the poverty impact ratio in the case of Tajikistan study shows that 59% of the consumer surplus would go to the poor. However, this is a conservative estimate, as most of the indirect effects of the project have not been accounted for in this method.

The methodology adopted for estimating the consumer surplus (based on the willingness to pay for the next best alternative) takes into account only the direct impact of the project. However, there are many indirect impacts of the project that should be estimated to understand the real impact of the project on the poor. In the sections below, based on the participatory assessment report done for the Tajikistan study, we estimate some of the indirect effect on the poor. Table 4.5 given below shows that incremental electricity available to the actual poor (Estimated on the basis of the % of poor in the area).

Table 4.5 Project components and benefit

Item	Unit	Part a	Part b	Part c	Part d	Total project
Economic capital costs(discounted)	$ million	13 08	14 37	7 63	0 67	35.75
Incremental energy	G Wh	1813	4249	1470	39	7571
Households served	Number	24481	0	148265	0	172746
% of actual poor	Number	23502		106751		130253
Electricity avail/h hold	G Wh	0 08		0 01		0.06

Assumptions

1. The poor will use the total incremental electricity available through the project, while the non poor will basically have benefits in terms of increased and more reliable supply of electricity.
2. The indirect benefit to the households from the project are assumed to be constant throughout the project time

Total benefit from the project (direct and indirect)

The consumer surplus in this case comprises of the following items:

- Willingness to pay for a connection (estimated on the basis of the cost of the next best alternative of energy supply in the area).
- Household savings
    - Costs of fuelwood used for cooking and heating (including the time spent- estimated in terms of the lowest wage rate- $ 2/day for 15 days in a month): TJR 25000 during winter and TJR 15000 during the other time of the year (average TJR 32000).
    - Piped water available- time for travel saved (especially for women) about two hrs a day which means approximately 2 dollars/month or 24 dollars /year.
- Household income (From increase in area under agriculture- part B of the project)
    - 2000 hectare of land will be irrigated and employment to about 10000 labourers-(average income from seasonal employment- TJR 6000/month for four months).
    - Increase in income from sale of produce (not accounted for as there is no information on land classification and market price to estimate the share of the poor).

Table 4.6 Total benefit of the project: household level

	Benefit/month	Number of households	Total benefit/year (million TJR)
Savings			
- Cooking and heating (time and costs)	32000	130253	50017
- Time saved due to piped water	1362	130253	2128
Income (from agriculture)			
- seasonal employment	12000	10000	480
Total benefits			52625 (26 mill dollars @ TJR2000/dollar)

The indirect benefit accruing to the poor-inters of savings and income (the industrial sector benefit has not been accounted for in this section) is approximately around 26 million US dollars per year (in other words the net present value of the total indirect household level benefit accruing during the project time is worth net present value of 139[30] million dollars). The total benefit (direct as well as indirect) is worth net present value of around 247 million dollars over the project period. The table attached shows the estimation and the revised poverty impact ratio of 85% (compared to the 60% estimated by the existing methodology of ADB).

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[30] Discounted at a rate of 12%

Table 4.7 Poverty impact ratio

Year		1	2	3	4	5	6	7	8	15
NFB		-4000	-35460	-43680	-10900	2500	9480	10660	12140	24640
npv-nfb	45,025 59									
in dollars	22.51									
NEB		4302	35536	41010	1873	24691	30828	33019	35925	47783
npv-neb	151,216 72									
Dollars	75 61									
nfb-nfb		8302	70996	84690	12773	22191	21348	22359	23785	23143
npv-neb-nfb	183,881 59									
Consum surp		4898 18	41887.6	49967 1	7536 07	13093	12595	13192	14033	13654
npv-cons	108,490.14									
Dollars	54									
h benefit		52000	52000	52000	52000	52000	52000	52000	52000	52000
npv- hhold	$277,068 99									
DOLLAR	138.53									
total benefit		56898	93888	101967	59536	65093	64595	65192	66033	65654
NPV	385,559 12									
Dollars	192 779562									
total	247 02									
PIR	85%									

"With/without project intervention" analysis

As most of the impacts of the environment projects in the energy sector are indirect, and therefore, difficult to estimate. However, poor environmental conditions can be very detrimental for both the health and the economic well-being of especially the poor as they are more vulnerable to risks. A study done by TERI predicts that the health impacts due to PM10 (respirable particulate matter) are likely to be 4 times higher at the national level, and 2.5 times higher in Delhi than those predicted by earlier studies. The study indicated that 74% of India's population, which is rural, bears 84% of the exposure burden. Table 4.8 gives the estimated per capita health costs due to air pollution in India.

Table 4.8 Per capita health costs (US$/year)

Strata of population	Low estimates	High estimates
Rural	51	160
Slum	57	211
Urban non slum	17	43
Female	57	171
Male	40	126

Given that the poor are more vulnerable, the intensity of these negative impacts are much more higher than on the non-poor, and therefore all kinds of energy projects that will improve the environment will one way or the other have a positive impact on the Poor. The only problem in establishing this relation is often the lack of data on the same. However if some information (Even qualitative) on the following can be collected, a "with/without analysis" would enable understanding the impact of the project on the poor.

- The linkage between the problem and the poor
- The negative impact of the existing environmental problem on the poor (Can be in terms of health impacts, costs incurred thereby, loss in productivity etc.
- A matrix indicating the positive impact of the project can then be made summarising the above information (see appendix 6).

Framework for programme loans

The ADB loan classification system Staff Instructions of October 2000 stipulate that the program loan has to conform to these guidelines, thus implying that a program loan can be of PI category or other than PI category. For program loans, an assessment and contribution to poverty reduction whether direct or indirect, should be made during the loan processing stage. Since the beneficiaries of the program or sector loans are not fully quantifiable, its impact can only be indirect. Under the ADB Staff Instructions (SI) of 30 March 1995, guidelines were issued on how to assess such program loans for determining its impact on poverty. These include calculation of various dimensions of impact on poor: direct, indirect, macroeconomic, and threshold (the near poor who might be made poor). This analysis is based on the assumption that growth can be used for poverty reduction, and the primary impacts of various policy changes are economic in nature. The SI do not require that the analysis be based on real data in the concerned sector.

The SI, although a good framework for assessing poverty impact assessment only addresses limited dimensions of poverty. It does not deal with poverty alleviation process, coping strategies, incentive effects of policies, and administrative organisations affecting implementation of remedial measures (DAI December 1998). The SI does not require identifying impacted populations ex ante or ex post. Therefore it is basically a desk exercise, and is also not required to consider interventions that exist outside the sector. It also does not consider the local institutional framework while preparing the policy matrix. In spite of these limitations, the SI of March 1995 remains a main analytical tool in the Bank for assessing the poverty impact for the program loans.

As stated earlier, poverty is multi dimensional. In a recent study[31], the ADB has attempted to identify it through certain criteria such as well being, access to resources, knowledge, and supportive policy environment. Following the World

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[31] Special Evaluation Study of Bank's assistance for Poverty Reduction of September 1999

Bank, it can be rephrased in various dimensions such as income, capability, empowerment, and security. Thus, any poverty reduction assessment should ensure that all multi dimensional aspects of poverty reduction are covered in the strategy. Against this background, we examine a case study on how the poverty reduction impact has been calculated in a programme loan project.

Case study: Power sector restructuring program (Indonesia 1999)
The project RRP calculated poverty reduction matrix for five components on restructuring the power sector- to create enabling environment for competitive market establishing competition, bulk supply tariff setting to ensure financial viability of PLN[32] and subsidiary companies, increase private sector participation to strengthen regulatory framework and redefine government role.

The poverty impact assessment the RRP examines the above individual components on "stand alone" basis. Its observations on the same as regards its net impact on poverty reduction are as follows:

- component 1: no comments,
- component 2: positive,
- component3: slightly negative in short run, positive in long run as it eliminates market distortions and promote efficient use of resources,
- component 4: positive,
- component 5: positive, promotes transparency and good governance,.

The project RRP came to the conclusion that the development of a competitive market in Indonesia will result in efficiency gains that will have a positive impact on economic growth and poverty reduction. This is however subject to strengthening consumer advocacy group for effectively representing the consumer interests before the independent regulatory body.

Various studies have shown that privatisation of infrastructure services such as electricity with an aim to introduce competition, will ultimately benefit the consumers. If one looks at some examples from India (especially with experiences from the Orissa infrastructure reforms and regulatory reforms), it can not be denied that the impact of such process comes slowly, the degree will depend on the supporting reforms process. After five year's of regulatory reforms at the sub national level along with the privatisation of electricity distribution system, the poor in Orissa are yet to receive quality electricity services due to its inadequate accessibility and poor reliability of supply. Thus, the poverty impact assessment, in the case of a programme loan, has to go beyond the theoretical exercise, and has to look in depth on the sector covering concerned issues such accessibility (including affordability) issues, strengthening regulatory mechanisms, capacity building, etc. Competition is hard to come in if other institutional issues are not addressed.

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[32] power utility in Indonesia

Further, the program loan is valid for three years, and the proposed changes in the institutional structure of the sector may take many years to implement and reap benefits. On the productivity side, what is achievable, even over a medium term horizon may give insight into the sector performance and its impact on poor. The project RRP however, calculated the impact of tariff on household expenditure, and estimated the impact on poor due to tariff restructuring ex ante.

Proposed "with" and "without" framework for poverty impact analysis of programme loans

In addition to the preparation of the existing poverty policy matrix, under the Bank's guidelines, it is suggested that the program may can be analysed under a "with" and "without" framework. This will help in calculating net economic benefits of the program loan. For determining the impact with loans, the ideal methodology would be to have general equilibrium analysis, as the program intervention affects the whole economy, not only the relevant sector. However, such analysis is costly and would require extensive data, which may not be available in a given pint in time.

This leaves the only alternative namely the partial equilibrium analysis. The "with and without framework" can be used in this context. The "with and without framework" can also quantify some impacts of program intervention on some parameters such as impact of changes of tariff structure on poor households, fiscal impact of policy interventions, impact on unemployment, etc.

In working out the "with and without framework", the analysis should have the following steps:

'Without program' policy interventions scenario

The "without" program scenario should develop certain benchmark poverty reduction indicators[33], so that these are monitored during the analysis of "with" the program intervention. The same should also be monitored during the implementation of the program. In the current example, the benchmark indicators may be:

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[33] Such as affordability of electricity, fiscal sustainability, improved governance, labour participation,

- household electricity consumption[34] by income group for all household connected to the PLN
- government subsidy to PLN and subsidiary companies
- number of employees category wise in the PLN[35]
- rural electrification intensity
- employment level in electricity sector and its composition into poor and non poor

'With programme' intervention scenario

For each of these baseline indicators, one can calculate the impact of the programme intervention. The net impact can be attributed as the ultimate impact of the project. In most of the projects only qualitative analysis is possible. Even a qualitative exercise on the same would be a significant indication of the kind of impact on poverty reduction.

Benefit monitoring

Inspite of the increasing nature of investments in the energy sector, there is hardly any measurement of the impact of these services, making it difficult to understand the impact of these interventions. Increasingly people are questioning how much these reforms have benefited the poor.

Measuring the welfare impact of energy sector interventions on the poor is not quite similar to measuring the impact on poverty. For example, an energy pricing reform might reduce the cost of electricity to poor households, directly increasing their welfare. The same price change may indirectly take some of these households out of poverty- by releasing women and children from the time consuming task of gathering traditional fuel, therefore increasing the income earning and productivity level of the entire household. Though measurable in principal, this ultimate effects is much harder to gauge with any reliability (Chong and Hentshel, 1999).Any kind of development interventions produces measurable physical outputs (for e.g. kilowats of power generated etc) and also some outcome. Outcomes refer to the direct effects of outputs of individuals well being, for example, increased number of villages electrified as a result of setting up a new project on transmission and distribution of power.

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[34] This will be used to monitor the likely affected poor people, and the proposed government intervention process through directed subsidy to these people below the poverty line, or designing life line tariff

[35] This will be required to determine the retrenchment of poor labour during the restructuring process

Outcome monitoring therefore involves tracking the progress in achieving the project goal (for example, improved T and D). It monitors the changes in outcomes over time and across groups and areas. On the other hand, impact evaluation assesses the changes in individuals well being that can be attributed to a particular programe or policy. In other words, an impact evaluation will enable assessing the immediate impact of the intervention, while the outcome monitoring can help us track the overall changes in the outcome over time. Monitoring and measuring the impact of any project is a learning expereince and helps in not only designing the project effectively but also ensures that the objective is realised in a sustainable manner.

To validate the ex-ante impact analysis done before the project, the system of ex -post analysis also have to be initiated. The Bank's guidelines on the benefit monitoring and evaluation [36] provides guidance about the Bank's policies about benefit monitoring. Though mandatory as per the bank guidelines, in the energy sector it is seldom implemented. Presently, there has been a change in the Bank's attitude and there is increasing realisation that benefit monitoring is required for the energy projects. For example, the Tajiskistan study indicated that a benefit monitoring and evaluation study will be undertaken based on the guidelines provided by the ADB, during the benchmark survey, annual reviews and after completion of the project. In fact in the energy sector projects, it should be made mandatory that atleast in all the distribution type of projects, this exercise of benefit monitoring should be carried out. Some of the indicators which should be monitored are:

- number of houses electrified and related operation and maintenance costs,
- electricity sale to the newly connected households and the related costs,
- new economic activities induced by introducing reliable electricity supply,
- average income level of the project beneficiaries
- types of non income benefits created by the electric supply (e.g. improved quality of life)

These information can then be analysed and the with-without analysis can be done and compared the ex-ante analysis. Table 4.9 below provides some of the essential and desirable criteria that have to be considered before selecting the final list of indicators.

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[36] ADB, Benefit monitoring and evaluation, a handbook for bank staff, staff of executing agencies and consultants, 1992

Table 4.9 Desirable properties of indicators

Criterion	Definition
Unambiguity	Indicators must be precisely defined so that their measurement and interpretation is unambiguous
Consistency	Indicators should give objective and not subjective data, that is they should be independent of the person who is collecting the data
Specificity	The indicators should reflect those things that the project intends to change, avoiding measures that are largely subject to external changes
Sensitivity	Indicators should be sensitive to project induced changes
Ease of collection	It must be feasible and relatively inexpensive to collect chosen indicators within a reasonable time frame

Source Casley and Kumar project monitoring and evaluation in agriculture, John Hopkins University press, Baltimore, 1987

Project cycle interventions

Based on the discussions in the earlier sections, the various stages where the suggested methodologies/analysis should be carried out are shown in figure 4.3 below. At the identification stage of the project cycle the participatory study should be conducted as it will make the objective tree and cause and effect analysis more realistic. The Benchmarking exercise should be carried out after the preliminary concept note has been prepared. While at the appraisal stage, both the macro level and the micro level analysis should be done. During the project implementation phase, data should be collected and monitored so that a 'with without' analysis can be carried out after the project is over.

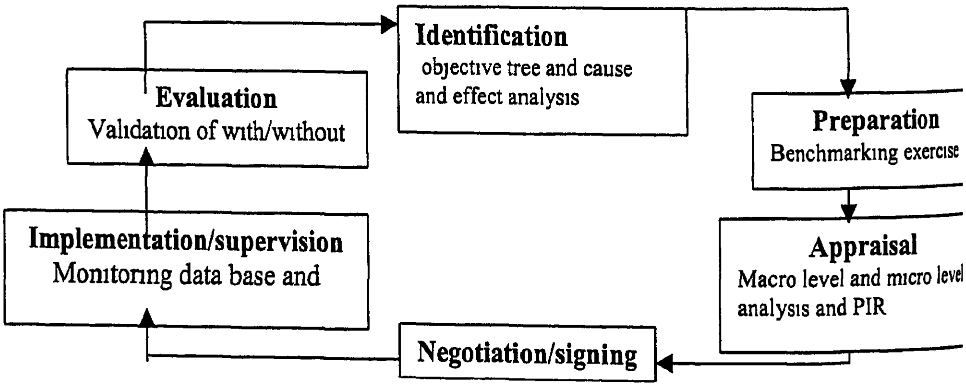
Identification
objective tree and cause and effect analysis
Preparation
Benchmarking exercise
Appraisal
Macro level and micro level analysis and PIR
Negotiation/signing
Implementation/supervision
Monitoring data base and
Evaluation
Validation of with/without

Figure 4.3 Project cycle interventions

Conclusion

Given ADBs overarching aim of poverty reduction and the broader scope of energy projects in general, the existing guidelines for incorporating poverty reduction strategy and poverty impact analysis have to be further strengthened. Based on the type of energy project (i.e. generation, transmission or distribution) specific methodology should be used. A participatory study should be made mandatory for all projects as this helps in designing the project to effectively target poverty reduction. In fact besides the ex- ante analysis, the post project impacts should be measured effectively. Therefore the exercise of monitoring and collection of information to assess the impact of the project should be carried out systematically during project implementation period. This database should be properly maintained and upgraded at regular intervals so as to assess the final impact of the project.

5

Analysis of IEEN projects and future directions

Chapter 3 and 4 will now form the basis of our evaluation of the IEEN projects. In earlier chapters, we have established the linkages of energy with poverty, and argued a case for appropriate energy development goals for achieving poverty alleviation outcomes such as income generation, enhancing capabilities, increasing securities, and enhancing empowerment of the poor. There is a need to carry forward the poor from lower rung of the income-energy ladder to the higher ones through appropriate energy related interventions commensurate with the desired energy development goals. The type of interventions would vary in different circumstances, and some of the details have been discussed in the earlier chapters. Further, in chapter 4, we have also developed a framework, and related checklists which would enable the IEEN to give appropriate poverty-reduction orientations to their energy projects during various stages of the project cycle.

One notices that the classification of ADB projects has been undergoing changes over the last few years. This has been reflected in the IEEN portfolio as well. Pursuant to the directives of the Bank, the IEEN had classified in 1999 all the pipeline projects into two types: growth based intervention, and poverty based interventions. During the 2000-02, it had summarized its portfolio into the following categories:

Table 5.1 Poverty Intervention summary of IEEN program 2000-02 ($million)

	2000	2001	2002
Poverty intervention (PI)	130(3)	85(2)	350(3)
Core PI	40(2)	50(1)	100
Percentage	30	35	40
Total	440(6)	250(4)	830(6)

Source. IEEN 1999

(Figure in the bracket indicate the number of IEEN projects)

Table 5.1 read with annex IV (an analysis of 12 randomly selected projects chosen from its previous portfolio) would suggest that there is a sharp departure from IEEN's efforts to pursue poverty reduction program over time: the poverty reduction goal has not been explicitly considered at all in those energy projects (Annex IV), although in 1992, the Bank had announced its intention to have poverty reduction as one of its strategies in its program in DMCs. This was, of course, in line with the general trend in the Bank's overall energy sector program since 1991. A Bank study shows that out of 123 loans since 1991 till 1998, only three[43] loans had classified energy projects (such as rural electrification) as growth projects being the primary objectives and poverty reduction being the secondary objectives. Primarily because, it was comprehended that energy projects can not have poverty reduction as its primary objectives, as these are always considered as growth oriented projects. The fact that indirect impact of energy on poverty reduction can be of greater magnitude, was not earlier comprehended. The situation has since changed. all the projects including the energy projects must now be classified[44]as poverty intervention (PI) projects or other than PI, the details of which have been discussed in earlier chapters. We now discuss a few IEEN project RRPs in order to examine on how the same concepts have undergone changes or have evolved over the project cycle, and what sort of poverty reduction parameters, if at all, had been factored in at various stages.

Case 1: Transmission connection and Reinforcement (PHI OCR: 2000)

The project was initially conceived as poverty intervention project, with growth as its SDO(secondary development objectives)[45]. It was expected to target 40 percent poor beneficiaries in Philippines as against the national average of 37.5 percent population lying below the poverty line.

The project was stated to have pro poor sustainable economic growth, which was based on the findings of a 1998 poverty impact assessment study saying that a one percent point increase in GDP leads to 0.94 percent of increase in employment, on the fact that the project will facilitate implementation of rural electrification program in Philippines, and finally, on the general presumption that availability of electricity in rural areas will enhance the productive use of labour resources to maximise household income. The project is also expected to address good governance, and social development aspects of project development. However, at the RRP (Report and Recommendation to the

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[43] Special Evaluation Study on Bank's assistance for poverty reduction(September 1999)

[44] Staff Instructions on Loan classification system conforming to the poverty reduction strategy (October 2000)

[45] Internal note of IEEN (Oct 1, 1999)

President) stage the project had been classified as pro-poor economic growth as its primary objectives. Thus, within a span of over less than one year, the project classification has been drastically changed.

Let us now look at the project components. The project objective, as per the RRP, is to provide high priority transmission facilities required to facilitate the TRANSCO's privatisation operation in Philippines in order to introduce the operation of the competitive market.

The project RRP described various poverty related issues at the national level, and discussed at length the details which are expected to benefit various unidentifiable beneficiaries in various sectors. It also relies on the findings of an Indonesian TA[46]which stated that "the percentage of villages with electricity was well correlated to poverty and could be used in combination with other indicators to support geographic targeting of poverty reduction program". Essentially, the argument for bringing in the poverty reduction emphasis into the project design emanates from the assumption that project will be able to facilitate implementation of rural electrification program, and through it, impact on enhancing income of rural households.

Accordingly, the project RRP calculated project benefit distributions (among poor, non-poor), and determined the poverty impact ratio[2]. It was indicated that a substantial net project economic benefit (to the extent of 28 percent) will go to poor, and the project can achieve its primary objectives of pro-poor growth.

Considering the benchmarks developed in chapter 3 for the policy or program interventions required to maximise poverty reduction outcomes, it appears that at best, the project RRP seems to look into one dimension of poverty alleviation outcomes, namely the income generation outcomes, without addressing other poverty reduction outcomes such as capabilities, securities, and empowerment to the poor. The logic that the project may have poverty reduction impact through the proposed "rural electrification program" of the Government can not be denied. This is however based on the assumption that the poor of the targeted "grid areas" could have access to electricity once the barangays are electrified. Our field visit to Philippines [47] clearly shows that even if a barangay is electrified by the Electricity Rural Cooperative, the poor may not get connection due its high up front connection costs. This barrier to the access to electricity may not allow the poor to meet their needs.

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[46] TA 2463 INO: Monitoring Poverty Indicators for $600000(11 December 1995)

[47] The calculation of PIR assumed the incidence of poverty (37.5 percent) as the benefit being shared to poor by the government. It has been estimated that at 14 percent being the share of poor in GDP (In Inequality and well being in Philippines with focus on Mindanao, by Kakwani Nanak, 2000. EDRC, ADB), the PIR is 34 percent.

The project RRP, however, did not identify the number of barangays which would require further rural electrification. In addition,

- Project RRP did not clearly indicate the causes of poverty in the project areas, and did not indicate how the project interventions would reduce poverty of the target groups
- Project RRP did not establish any parameters for measuring project's poverty reduction impacts in respect of target (as well as control) population during and beyond the period of project implementation
- The project did not specify the poverty linked governance and institutional reforms issues so as to reach the project's potential benefits to the poor
- The project RRP did not indicate whether project components were formulated or confirmed through the participatory approach during the PPTA stage.

It is, however, true that a power transmission project can not identify target beneficiaries in the present case, as the electricity is being reached through grid to distribution company (either Meralco or Electricity Rural Cooperatives), and finally, to the end consumers. But, this type of projects are sin qua non for the country" economic growth. What is needed perhaps is to orient these kind of projects for giving it a poverty reduction dimension. Various options could be explored. One such option is to design such projects after incorporating certain components relating to strengthening of distribution segments and introducing a component for grid based rural electrification. Whether the benefits in such cases could go to the poor would depend on the effectiveness of delivery mechanism, and other associated governance issues. The distribution of benefits could be uneven in such program in certain circumstances[48].

In effect, to transform this kind of projects into a poverty reduction oriented project, specific steps are called for even at the initial stages of project conception, and PPTA stage of the project cycle. And, these kind of projects are required to follow certain steps as stated in Chapter 4.

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[48] See 642-LAO Vientiane Plain Rural Electrification program under Special Evaluation Study of the Bank's assistance for poverty evaluation (September 1999).

Case 2: Sixteenth Power (Masinloc thermal power) project (loan - 1042 -PHI)

The main objective of the project was to augment the base load generating capacity of the Luzon grid by providing an efficient and economic supply of electricity. The power plant (2x300 MW) utilises low sulphur coal imported from Australia, PRC, and Indonesia. Raw water for the plant is sourced from the nearby Lawis River, while the sea water for condensing the steam is obtained from the Oyon Bay, while the used sea water is discharged into the Oyon Bay. The Project Completion Report (PCR) was prepared by the Bank in October 1999.

It was a growth oriented project, and only social issues considered under the project were the resettlement issues for a fishing community of 198 households from the plant site. About 143 hectares of land were acquired under the project. In addition to the settlement plan, the NPC (National Power Corporation) introduced two livelihood program) a P 1.86 million fund administered by the Relocatee Association for the exclusive use of resettled persons in Taltal, and a P 10 million fund for the beneficiary residents of the Masinloc town. Further, the NPC is required to allocate certain funds depending on its sales of electricity, P 0.01 per kwh of electricity sold (under Energy Regulation 184 of the Government of Philippines) for the development purposes in the local provinces/local municipality/barangays. The projects under this scheme would require approval from the Department of Energy before execution.

The PCR commented upon that during the preparatory stages of the project where significant social impacts are expected, public consultations should have been started early. Further, during the design of the livelihood programmes for the affected people, the ownership of these programs should have been ensured. Also, "the execution of such livelihood program should be entrusted to the agencies capable of handling the, rather than the traditional power sector executing agencies", the report said.

During our visit to the resettlement site[49] it has been noticed that the fishing community which did not use electricity before the operation of plant, are using the same which has definitely changed their life pattern. Further, provisions under the Energy Regulation (ER) 184 of the Government of Philippines contain the fact that the local authority can get a share of the project revenue subject to the approval of the Department of Energy.

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[49] Please see Annex 1

While such provisions under the ER 184 are available in the case of power generation projects, it has not been extended to the power transmission project in Philippines. As a result, the benefits out of such projects situated in a particular area cannot be passed on the local people including the poor. It is an issue worth examining, in the sense that a transmission project may even benefit poor directly in the areas where the project is situated provided a mechanism of sharing such revenues is established, of course, in consultation with the Government.

Case 3: Wind Power Development Project (PRC, 2000)

The project was initially conceived as poverty intervention project, with environment as its SDO[50]. At the conceptual stage, the target beneficiaries were not known. At the RRP stage, the project has been classified as environment project as its primary objectives. In 1999, it was envisaged that the project will benefit poor by improving their health and living conditions through providing improved power supply in an environment friendly manner, and assist the government in addressing certain governance and social development issues.

The project, as indicated in the RRP (September 2000), seeks to produce electricity in an environment-friendly manner and increase the share of wind based electricity in overall power generation through establishment of grid connected rural farms and thereby, avoid emissions of sulphur dioxides (11000 tons), nitrogen oxides (7400 tons), total suspended particles, (5000 tons) and carbon dioxides (1.94 million tons) associated with thermal power generation. The estimated net present value of the environmental benefits from avoided air pollution at the national level is about $12.3 million, while the net present value of global environmental benefits from avoided CHG emissions is estimated at $14.2 million at the minimum. The project components comprise of construction of wind farms at Dabancheng in the Xinjiang Autonomous region, at Fujin in Heliongjiang province, and at Xiwaizi in Liaoning province, and other steps for barrier removal and institutional strengthening to promote wind based power generation in the three region.

A perusal of the project RRP would show that the urban population as well as rural areas in the three regions, on an average, have average income which is well above the annual per capita national income as defined by ADB for the purpose of defining the poverty level[51]. On the poverty reduction aspects, the

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[50] Internal note of IEEN (Oct 1, 1999)

[51] The PRC considers an annual income of Y635 per capita as poverty line. ADB uses as the poverty line an annual per capita income of Y 1000 for rural areas: an annual per capita

Project RRP stated that "clean energy projects such as wind farms would contribute to poverty reduction by avoiding environmental pollution, which disproportionately affects the poor, and by creating new job opportunities". It further calculated that a minimum of 390 job years for operation and maintenance of wind farms would be created, stated that there will be transfer of turbine transfer technology from abroad to PRC, which would create 17 job years for each MW manufactured in PRC. The project RRP also mentioned that under a proposed JFPR (Japanese Fund for Poverty Reduction) financed sub project, off grid electrification of poor communities in the Xinjiang region through the installation of the wind turbines would be considered. Since it was classified as environment project as its primary objectives, neither benefit distribution nor PIR was calculated at the RRP stage.

Interestingly, the IEEN has recently conducted a study[52] (October 2000) for ascertaining the views of the woman on project's contribution to the satisfaction of basic human needs, and for ascertaining their views on poverty reduction impact of the project. The study concluded that:

- The small power generation station by *renewable energies* would be the most cost effective investment for electrifying the poverty areas since, the average distance for wiring a non electrified township is 30-40 km, and the mean cost is 90 thousand Yuan per km, which is considered very high.
- Given that the most non-electrified township are located in remote poverty areas and networking is possible only at higher costs, use of local renewable energy would be the preferred option. Wind could be one option: solar, biomass, and hydrology are also potential sources depending on local natural conditions.
- Empowering local community through capacity development may be essential for better management of the project: the support personnel could be drawn from the villages.
- Given the nature of the proposed wind project activities, there is a need to coordinate with the on-going women improvement and poverty alleviation projects in the three provinces.

The findings of the above study would clearly show that participatory approach seeking the views of the stakeholders certainly would have helped in

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income of Y 2000 for small island urban areas, and an annual per capita income of Y3000 for coastal or large urban areas

[52] Under RETA 5889-Gender and Development for $ 850000 approved on 23 December 1999.

better design the project for maximising its poverty reduction impact. The selection of the project site on consideration of poverty reduction, identification of the poor and non-poor in the regions, identification of causes for poverty in the regions, poverty focussed institution building, etc, as brought out in the study, brings out a piquant situation where a typical environment project (namely project at case 3) may seem to lack poverty reduction components[53]. However, as elaborated in chapter 3, the environment project has positive impact on poor as environmental degradation has disproportionate negative effect on them vis-a-vis non-poor.

Further, through JFPR funds, it is possible to add up a sub project covering the recommendations of the October 2000 study for addressing poverty reduction issue in the area. It is debatable whether a typical environment related project should have a poverty reduction component in all cases, or there should be an add-on to the original project like in the present case. It is however, suggested that such add-on project may be taken up in this type of project.

Case 4: Power Rehabilitation Project (TAJ 2000)

The project was initially conceived as core poverty intervention project, with growth as its SDO[54]. It was expected to target 70 percent beneficiaries in Philippines with on an average, 70 percent population falling below the poverty line. At the RRP stage (September 2000), the primary objective of the project was stated to be poverty reduction.

The RRP placed the project objectives as: improving people's quality of life and support in project areas through increased availability of electricity, assist in the post conflict economic recovery of Tajikistan. These are expected to be achieved through increasing availability and reliability of power supply in an environmentally manner, and rehabilitating generation, transmission, and distribution facilities. The project components included: a) rehabilitation and power supply improvement in post war damaged areas of Khatlon Oblast, consisting of rehabilitating CHPP, strengthening transmission, and distribution networks, installing consumer meters, and provision of electricity supply to about 24,000 poor households; b) rehabilitation of NHPP and associated transmission facilities to improve reliability of power supply; c) rehabilitation of two major distribution subs stations in Dushanbe region to improve reliability of power supply to about 148,000 mostly poor households; and d) improvement of bulk metering of import and export of electricity from and to Uzbekistan and the Kyrgyz Republic.

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[53] In this case, the current loan classification which requires that any project (even the non PI project such an typical environment project) should have components for poverty reduction

[54] Internal note of IEEN(Oct 1, 1999)

The project identified the causes of poverty in the region during the Initial Social Analysis and subsequently through a participatory approach[55]. The poverty reduction impact of the project was assessed during the project preparation: through focussed group discussions, village level workshops, discussions with interested groups, and a national level consultative meeting with stakeholders. The participatory process helped the project authorities to understand the quality and accessibility of electricity and its various linakges[56] with levels of poverty in the project areas.

The project RRP also showed additional potential for poverty reduction due to the project interventions. It stipulated that there were high levels of poverty incidence in the project areas particularly in rural areas, that energy use had regressed from electricity in the lower rungs of the energy ladder, electricity is a basic necessity of life alongside water, food, clothing and shelter, that there is high economic costs of using alternative fuel in addition to time, labour, health, social and gender impacts of the scarcity of electricity, that the household recognised energy as their basic need for the large agricultural base which is dependent on electricity for its irrigation and can generate employment only when there is regular supply of electricity, that provision of health services and education have hampered due to lack of electricity, and that employment and small entrepreneurial activities could only be undertaken subject to availability of electricity. The project RRP also calculated benefits distribution and poverty impact analysis, and showed that PIR (poverty impact ratio) is very high. In the case of monitoring of the project benefits, it identified certain parameters for monitoring at different stages of project implementation. It was also stipulated that the project at the end would prepare comprehensive report on poverty reduction impacts for Bank's review.

In effect, at various stages of the project cycle in the instant case, the project staff considered the poverty related issues, identifies the project areas on the basis of participatory approach, and developed a mechanisms to monitor the parameters for poverty reduction and to review at the conclusion of the project. The instant approach shows that the poverty reduction strategy should start at the early stages of the project cycle, would continue at all the stages, and should not end once the project is signed.

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[55] TA 5894 REG Facilitating capacity building and participatory activities

[56] See chapter 4

Case 5: Power sector restructuring program in Indonesia (RRP INO 31604, February 1999)

The program loan had been categorised as "economic growth" with the objectives to establish a competitive market for electricity in Java-Bali which will increase economic efficiency. The program components are:

- Restructuring the power sector and creating an enabling environment for a competitive electricity market.
- Establishing competition in the supply of bulk electricity in Java-Bali, initially with a single buyer and by 2003 with multiple buyers and multiple sellers.
- Setting tariff and ensuring financial viability of PLN (Perusahaan Perseroan (persero) PT (Perusahaan Listrik Negara) and newly subsidiaries during the transition period.
- Increasing private sector participation.
- Strengthening the regulatory function including protection of end consumers.

Poverty impact assessment of the program loans

The RRP following the Bank's guidelines for the assessment of the impact of program loan on poverty of 30 March 1995, carried out a poverty impact analysis, and came to the conclusion that program's impact on poor is positive in all its components except in component 3 where there will be short term negative impact and long term positive impact once the market distortions are eliminated and efficient use of resources is promoted. The program loan also considered, like any other Bank's public sector reform program, social electricity development fund and social protection plan, an ameliorative measure, rather than proactive measure to restructure the economy rapidly and provide jobs to the poor or near-poor. It also assumed that the retrenchment packages, unemployment benefits, targeting subsidy to poor consumers, etc, are sufficient response. Further, it stipulated that with establishment of competition of electricity in bulk supply, poor will have increased access to electricity as a direct positive impact of the program loan. The RRP also did not address other access related issues or socio economic dimensions[57], perhaps because the existing instructions of the Bank do not require the same for the poverty impact assessment of the program loans.

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[57] Access such as governance, discrimination, geography (poor regions), legacy (asset distribution), or socio economic dimensions such as coping mechanisms that mitigate the socio-economic impact of economic stock, and impoverishment as a process. 9DAI 1998)

In particular, the RRP did not indicate whether participatory approach as outlined in Chapter 4 had been adopted in this case. Suggestions for adopting the same in future program loans have been outlined in the previous chapter. However, the loan have addressed some of the issues such as tariff impact on consumers, and capacity building of civil societies through technical assistance programs.

Case 6: Renewable energy development project in China (TA[58])

We present the findings of a TA report in order to highlight the implications of energy development through the NRSE (new and renewable sources of energy) route and its potential impact on poverty reduction. The study was primarily conducted to assess the potential for commercial development of renewable energy in China. Some of the interesting conclusions are presented below:

- Use of renewable energy resources in China could be expanded far beyond the existing government targets at lower costs than current fuel alternatives.
- On the commercialisation of three technology sectors such as solar thermal, bagasse, and biogas, the solar has the greatest potential for commercial development in China. Its potential impact is very high, as PRC can avoid installation of about 7000 MW in new power generation capacity, and displace 29 million tons of carbon dioxide every year. The solar thermal and bagasse generation projects as identified by the TA, meet ADB's criteria for project assessment.
- Changes of government policy and institutional delivery mechanism would be the key to success to the above program: all renewable energy technologies would benefit from such changes in China, as these would reduce transaction costs and improve access to credit.
- The poor can meet its energy needs without burning coal by using other sources, thus a net positive impact on environment.
- The poor can access to expanded employment as unskilled workers in the manufacturing and service sector: solar thermal systems employ more people per unit of energy output than conventional system.
- Although renewable energy systems are frequently least cost options for supplying energy to remote areas, the costs of developing and installing

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[58] Under TA 3056 PRC. Final report as in September 2000.

energy systems will exceed the ability to pay by the poor in most remote areas. Most remote areas in China would require complementary government support for any loan repayment, although more advanced remote areas can repay the investments from the increased resulting income.

- Biogas in remote rural areas is a main fuel for households and account for about 60 percent of energy consumption: before introduction of biogas technology, farmers had to collect firewood and stalks for fuels causing damage to surrounding areas.
- Different forms of renewable energy have different impacts on employment generation. Bagasse cogeneration in the sugar industry in China has the greatest influence on employment: the stronger the economics of a sugar mill, the higher the employment stability for sugarcane suppliers or farmers. A typical sugar mill of 5000 ton capacity will be supported by 150000 mu of land, translating t about 3000 families or about 12000 people.
- Solar heating and PV industries, being new sectors in China, have the possibility of creating more jobs if expanded.

In sum, the impact of NRSE on poverty reduction may vary depending on the choice of the technologies, and also on the delivery mechanisms in the country. The study did not indicate the methodology for measurement of benefit incidence to poor.

Further, the degree of social impact of the NRSE would depend on the choice of technologies: for instance, quality of life can be enhanced through the use of solar thermal or biogas, employment by bagasse or solar thermal, and health by biogas, or bagasse in rural areas of China. These are in addition to the high positive environmental impact in the areas due to the use of NRSE: for instance less use of coal and less degradation of forests may certainly translate into high positive environment impact in the areas. The methodology for measuring such indirect impact was not suggested in the above study.

IEEN portfolio during 2001-03

Table 5.2 shows that during 2001-03, the IEEN is expected to process 16 project loans worth US$ 1700 million, and 29 Technical Assistance worth US$ 20.1 million in the energy sector in six countries such as Philippines, China, Indonesia, Kazakistan, Kargyz Republic, and Tajikistan. The Poverty classification for 15 project loans is ODI (other development interventions), the remaining as PI (poverty interventions) in China. The following paragraphs would discuss select project loans, suggest certain measures for maximising their social impact, and indicate the methodology for assessing the impact ex-ante.

Table 5.2. Details of IEEN'S energy sector portfolio during 2001-03

	Project loan (US$ in million)	Technical Assistance (US $ in thousands)
Philippines	260(3)	2900(4)
China	900(6)	8200(11)
Indonesia	450(3)	2300(3)
Kazakistan	30(1)	2200(3)
Kargyz Republic	40(2)	1850(4)
Tajikistan	20(1)	2700(4)
Total	1700(16)	20150(29)

(Figure in the bracket indicates the number of loans/TA)

Framework for evaluation of IEEN portfolio

In Chapter 3, it has been argued that the poverty alleviation outcomes through various interventions are income growth, increasing capabilities, increasing security, and more empowerment of the poor. Logically, the energy development goals, as envisaged in the various ADB's policy documents, should relate to expand access to modern energy to poor, improve energy supply reliability to poor households, ensure fiscal sustainability of the delivery mechanisms, improve governance and regulation required to deliver services inefficient manner, and reduce health and environmental costs to the poor.

The energy linkages and impact resulting from the above poverty alleviation outcomes are restated as follows: income outcomes are led by use of energy a) which are essential for business, b) which enhances labour and capital productivity, and c) which ensures macro stability; capabilities outcomes are the result of energy use a) which are essential for health care, and children education, b) which are essential for complementary infrastructure, c) which are essential for health improvements; security outcomes result from energy use a) which provides illumination and personal security, b) which ensure environmental sustainability; and empowerment outcomes are derived from a) people's ability to choose energy services, b) people's access to information (radio, TV, etc), and c) increased accountability of service providers.

Given this framework (See chapter 3), we now examine the IEEN portfolio for assessing their impact on poverty reduction. It is suggested that the checklist for the project cycle as argued in Chapter 4 should be followed in all the cases.

An energy project per se may not reduce poverty although prima facie it looks so. For instance, a wind power project using grid supply may not reduce the poverty in the nearby region, although the sources are renewable, and environment friendly, and disproportionately impacts poor. Similarly, a transmission and distribution rehabilitation project, although is viewed as growth oriented project (Box 1), can be oriented better towards poverty reduction[59]. Thus, one has to examine projects on individual basis, and country by country.

In this chapter, the components of energy projects which should have maximum social impact are discussed. Some of the observations have been made at generic level for want of project details which are yet to be firmed up by IEEN. Further, various projects are different stages of consideration: pre design stage, or design stage. Therefore, for want of knowledge of project specific details, we would suggest generic components based on the above poverty reduction framework, and the sector strategies of the ADB in a given country.

Existing guidelines on loan processing

As stated earlier, loan proposal in 2001 onwards should be classified as *poverty interventions and non-poverty interventions*. The criteria to be used for this poverty classification for loans are a) the proportion of poor among beneficiaries, and b) impact or benefit analysis. It has been stated that all loan proposals marked as *poverty interventions* should demonstrate whether and to what extent the poor are benefiting from ADB lending. An analysis of expected impacts if required to assess how the poor would benefit from the loan. In the case of projects marked as *non-poverty interventions,* the loan proposals should explain how the poor would benefit, even it this is done qualitatively. Unless the poor benefit, a project loan can not be said to contribute poor. During the analysis, our attempt is to ensure that the social impact of the project in the context of poverty reduction is maximised.

China's energy portfolio 2001-03

Project 1 Shen De System Improvement & Electrification Project

The project is classified as ODI (other development interventions equivalent to non-poverty interventions (NPI) under the October 2000 classifications). It seeks to evacuate surplus power in Inner Mongolia and transmit to Dalian. The Country Assistance Plan (CAP) envisages that this activity will boost the economic growth in the Inner Mongolia area, as well enable Dalian to access to power with less air pollution (for not using coal). Inner Mongolia is a province with 31 poverty counties, and about 20 percent population have less than RMB 500 in 1993. The following are the details indicated in the CAP.

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[59] TA Power rehabilitation project in Tajikistan

Project objectives included under the CAP are:

- Support sector and enterprises reforms in power sector of Liaoning province
- Augment power transmission capacity and system improvement to support economic development in the province.
- Expansion of electricity in rural areas.
- Improvement of environment of through closure of old and inefficient thermal plants

Project components included under the CAP are:

- Establishing additional 500 kV transmission facilities
- Providing related 110 kV and 220 kV transmission facilities
- Modernising the old dispatch and communication system
- Connecting to rural households in Liaoning (Liaoning is a Northeast province with nine counties having about 3 percent population with income less than RMB 500 in 1993)
- Closing down inefficient and polluting power plants.

We did not have the project details with components being considered at the PPTA stage (1999). Based on the experience during the field visit in Philippines, as well as on the observations made in "Participatory Study on Power and Poverty in Tajikistan" (TA 5894 REG), we analyse the project for its impact on poverty reduction in its present form, and suggest the need for additional requirements if it were to maximise its poverty reduction impacts.

Our field visit to Philippines project confirms that the direct employment generation capacity at the site level, of any transmission project is marginal. Secondly, the end beneficiaries of a transmission project can only be identified if the supply through its distribution network is on an exclusive basis, namely, the evacuation of power from Inner-Mongolia to Dalian is dedicated, and the power is not fed into any grid. But, it would not be the case, as the ultimate objective in China is to introduce competitive power market through inter connected grid. Thus, in the instant case, the end beneficiaries can not be identified. Third, the closure of inefficient and old power plants will definitely reduce air pollution, and the measures will certainly benefit poor, although disproportionately, compared to that accrued to the rich in the areas. Fourth, the project components envisage rural connections in Liaoning. Rural connection by itself will not ensure that poor will get the benefit of new rural connection , if the connection costs are not affordable. Thus, additional measures are required to eliminate this barrier. Fifth, the quality of life of poor can only be enhanced if the supporting infrastructure are also strengthened. During the proposed participatory study, this aspect should be examined.

In this connection, the Tajikistan study is worth mentioning (see above at project 3). The *Power Rehabilitation project* components were confirmed through a participatory study. The study showed that the project will provide direct employment: it will create an environment conducive to generating more jobs through i) provision of more electricity, a direct input of production, ii) freeing up more time on using energy alternatives for direct productive activities. The project will have significant impact on poor and women being the vulnerable groups in the region". The study further stipulated that power rehabilitation should be integrated with other physical and social infrastructure, and there is a wide potential for community participation and social mobilisation for addressing energy related issues such as energy conservation, safety, use of environment friendly energy, energy choices, etc.

Effectively, the Shen Da Project may not address the concerns of the poor in the region unless the project is better designed. We are not advocating at this point that all power transmission projects should have to reduce poverty directly. What we are saying is that if the current project is to orient its focus into the direction of poverty reduction, given the ADB's over-arching objectives of *Poverty Reduction,* it has to process and address the above concerns. Here we are using the word "poverty" in a broader sense, the poverty reduction outcome, which should not only include income generation, but also enhance their capability, empower the poor, and also provide them security. The corresponding energy development goals should be to expand access of modern energy to poor, improve energy sustainability, ensure fiscal sustainability, improve governance and regulation, and reduce health and environmental costs. Thus, the suggested poverty reduction objectives and scope of the project would include:

Poverty reduction objectives

- Increase access to modern energy
- Increase reliable supply of energy
- Improve governance and regulation
- Ensure fiscal sustainability

Suggested project scope and design element

- Establishing additional 500 KV transmission facilities, and provide related 110 KV and 220 KV transmission facilities.
- Rehabilitation of the existing distribution system for reducing system losses in the poverty counties of Liaoning.
- Close down old, inefficient and polluting power stations.
- Rural electrification program in the rural areas in the poverty counties of Liaoning.
- Improve reliability of power supply in the poor region through modernising old dispatch and communication system and system improvement.
- Tariff reform: metering of power supply at the end consumers, affordable power to the poor people (life line tariff for minimum use). Easing first cost constraints: provide consumer credit and connection subsidies, micro finance.
- Community participation in managing power supply. Empowerment of the communities in rural areas.
- Improved governance and regulatory reform, and establish institutional capacity to manage electric supply on sustainable basis.
- Mitigate negative effects of biomass use on health.

The above suggestions on the project components are generic, as the suggested "Participatory Approach" study could also identify the causes of poverty in the rural areas and suggest specific project components required to address poverty reduction. Further, the checklist as suggested in Chapter 4 should be followed if the pro-poor benefit of the project.

Methodology suggested for maximising poverty reduction impact

- Objective tree/cause & effect analysis
- Benchmarking exercise
- PIR
- Macro level impact analysis

Project 2 Acid Rain Control and Environment Control Project

The proposed project seeks to address the environmental concern due to acid rain deposition in the south west and eastern Yangtze river valley in Anhui province. The acid rain control zone is expected to cover 10 designated poverty counties out of the 22 such counties in the province. Acid rain reduction and environmental improvement in the province are envisaged to enhance soil and water quality; and thereby, improve agricultural and forestry production. Additionally, improved air quality will also improve the health condition of the poor people. The project has been classified as ODI with environment as its cross cutting operational priority. Under the CAP, the project seeks to:

- Formulate measures for improving the policy framework for reduction of SO2 and other acid rain causing gas emissions.
- Finance sub projects that promote cleaner production, reduce acid rain and air pollution improve environment.
- Strengthen institutions for environment monitoring and enforcement including human resource development.

Project components suggested

- Relocation of Wuhu Feiyeng Wood Chemical Corp. Ltd.
- Relocation of Wuhu Limin Dyestaff Plant
- Reduction of industrial discharges in Wuhu Iron and Steel Plant
- Partial reduction and cleaner production in Chizhou Non ferrous metals company
- Waste minimisation in Arnquing cement plant and Anquing power plant
- Industrial technology enhancement of Tonglin chemical industry group, Wuhu Hengxin metal group, and Tonglin Jinchang metals
- Environmental rehabilitation and conservation of the Yellow mountains World Heritage system
- Rehabilitation of environment and biodiversity protection in the Jinhua mountains national park
- Strengthening of Anhui provincial and municipal EPBs

The project seeks to allocate $130 million for SO2 reduction in 8 industrial sub projects, $25 million for acid rain damage rehabilitation in ecologically sensitive areas, and $ 5 million for institutional strengthening. The annual expected environmental benefits are the reduction of: 28363 tons of SO2, 1090 tons of COD, and 66,919 tons of TSP.

It may be recalled that the acid rain reduces agricultural production in the areas, in addition to having negative effects on health of local people including the poor. The sources for the causes of acid rains in the areas could be many: use of coals by people in the areas for their domestic use, non point sources of coal burning, power production the industrial emission of SO2 due to coal etc. There is no definite proof that the SO2 emission is only due to the presence of polluting industries in the area under consideration. Thus, with this presumption, certain components could be built into the project in order to make it pro poor. The interventions could be specially targeted to the poor counties. The recent TA negotiation (Oct 2000) is stated to include a participatory approach for determining the additional project components for identifying the causes of poverty in the 10 poverty county areas and suggesting mitigating activities. Presumably, the study will bring out the specific project components for reduction of poverty in the poor county areas. It is suggested that the project components should have certain interventions that would result in income generation to the poor, enhancement of their capability empowerment, and improving their security.

Suggested additional project components

- District heating in affected areas
- Mitigating health effects due the biomass use though application of mini hydro in the areas
- Improving the productivity of agricultural land in the poverty counties.

There is a need to build into the existing project certain sub projects, the components of which could be assessed through the Participatory study, as stated above. The link between the poverty affected areas in the province and the acid rain issues (such as crop damage and health effects) need to be established, and the sub project components may be designed through such participatory process. The sub project could be financed out of JFPR funds.

Methodology suggested for maximising poverty reduction impacts

- Objective tree/cause & effect analysis
- Benchmarking exercise
- Macro level impact "with" or "without" analysis
- Micro level impact "with" or "without" analysis

Project 3: Western region small hydropower and rural electrification

The project is being classified as PI project in Gansu, a north west province, one of the poorest province of PRC. It has 41 poverty counties, 81.51 per cent population living in rural areas, and 45.15 per cent rural population with less than RMB 500[60].

Project objectives

- Increase power supply to rural areas near Langzhou
- Upgrade expansion of electricity distributions in rural areas
- Improvement of environment through avoiding polluting thermal plants

Project components being included

- Augment power supply capacity in Gansu with construction of Chaijiaxia 90 MW run-of-river hydro power plants and Hekou 90 MW run-of hydro power plant
- Provide 110 kV sub transmission line for grid connection
- Improve rural distribution system
- Institutional strengthening of Gansu Hexi Hydro Power Development Company (GHHDC)

The project (the completion date being 2006) will be able to generate about 1000 gigawatt-hours of electricity, the direct beneficiaries of which would be the existing and future industrial, commercial, residential and agriculture consumers in rural Gansu. It will thus avoid construction of coal fired plants in Gunsu. It appears that the selection of project site is based on poverty reduction consideration. Components are being chosen to address the poverty reduction as its primary goal. The project essentially falls into the type of suggested in the October 1999 *Poverty Reduction Strategy Paper* of the Bank, which says that "increased emphasis will be given to rural electrification and renewable energy". In this regard, we suggest the following project objectives.

Poverty reduction objectives

- Improve people's quality of life and support poverty reduction through increased access of electricity
- Increased availability of reliable supply through environment friendly manner by using mini hydro power plants

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[60] PRC considers Y 635 as the poverty level while ADB takes Y 1000 as the poverty level for rural areas.

During the participatory study at the PPTA stage, the causal relationship among energy-poverty should be established, and project components be firmed up. However, the following suggestions on the subject are made.

Suggested additional project components

- Strengthen the transmission and distribution network
- Meter installation
- Better governance and regulatory reform
- Tariff reform. Low life line tariff covering small block of electricity related to minimum use level
- easing first cost constraints
- Private participation in energy services
- encourage community participation

Methodology for maximising poverty reduction impact

- Objective tree/cause & effect analysis
- Benchmarking exercise
- PIR
- Micro level analysis

Project 4: Hebei Zhanghewan Pumped Storage

The Habei Province of PRC has 39 poverty counties, 83.9 percent population live in rural areas, and 15.56 percent rural population has per capita income less than RMB 500. The project (2002) has been classified as ODI in CAP and subsequently, as PG (Pro poor growth), which under the new classification could be other PI. The Fact-finding Mission for the project was completed on 29 October, 2000.

The Hebei South Power Grid (HSPG) experiences frequent power interruptions due to inadequate capacity in its power grid to meet the growing peak load. The neighbouring China grid does not have spare peaking capacity for the HSPG. As a result, the Hebei Electric Power Company (HEP) operates its coal fired power-generating plants for peaking, although these are not sufficiently flexible to meet the rapid loan variation during the peak hours. In poverty counties of the project areas, supply constraints limit the use of electricity to lighting purposes. The following may be noted.

Project objectives included

- Increases power supply, thereby supporting economic growth in Hebei Province
- Improve quality of power supply to all consumers

Project components included

- Construction of 1000 MW Zhanghewan pumped storage power plant
- Construction of a 56 km long 500 kV transmission line connecting the storage plant to Hebei south system at Shinan sub station
- Closure of power generating units 50 MW or smaller in six coal fired plants (totalling 566 MW)
- Rural electrification in one city and 19 counties (of which, 10 are national poverty counties, and 4 are provincial poverty counties) consisting of sub station and distribution system at 400v, 10kv, and 110kv at two different stages
- Strengthening HEP's institutional capacities

We reframe the above project objectives, and the various interventions which would give maximum poverty reduction outcomes as discussed in chapter 3.

Suggested poverty reduction objectives

- Increase electric supply reliability
- Expand access to electricity
- Improve governance and regulation
- Reduce health and environmental costs

Additional program components suggested

- Encourage community participation
- Ease first time constraints
- Private participation in energy services
- Consumer pricing principles
- Subsidy targeting and its delivery
- Mitigating biomass use

The above components are generic in nature. The same would require to be firmed up through a *socio economic and poverty assessment*[61] for examining the needs and priorities for electricity in rural areas, identifying the causes of poverty, and finding out the potential benefits accruing from the improved rural electricity distribution in those areas. The assessment is expected to address the needs and priorities of the low income people including women. It is suggested that the study should be of the participatory type as suggested in chapter 4.

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[61] As indicated in the Aide Memoire of the ADB Fact-finding Mission (11-29 October)

The rural electrification program should specify the number of villages electrified, number of rural household to be connected, number of new substations to be constructed, number of distribution transformers to be positioned, length of low voltage and other electric lines, etc.

Further, the HEP would be required to monitor the performance of the rural electrification program by conducting surveys at agreed intervals on the following: a) actual number of connected consumers in various categories including poor, b) average consumption rates for each category of consumers including poor, description of new economic activities induced by the introduction of electricity, d) description of existing economic activities that have switched to using electricity and thereby become more efficient and productive, e) perceived various types of non income benefits such as improved quality of life. The details have outline in Chapter 4.

Methodology for maximising poverty reduction impact

- Objective tree/cause & effect analysis
- Benchmarking exercise
- PIR
- Macro level impact analysis

Project 5: Inter-Regional System improvement

The power system in China comprises of 27 provincial power grids. In order to enhance the efficiency of the power system and to alleviate the power shortages in major load centres, regional networks have been formed covering north-east, north, east central and north-western regions. Each regional networks consists of 3-4 provincial grids. Interconnection among regional networks would reduce the need to transport coal over long distances and would improve the dispatch of electricity and the meeting of peak loads. The present project seeks to interconnect between central and north power regions.

PRC is giving high priority to infrastructure development in its poorer and underdeveloped region in the western and central region. These regions cover two-third of PRC's land areas and are rich in clean energy resources such as gas and hydro power which remain largely unutilised. Regional transmission interconnection between west to east regional grid would help the poor in many ways:

- There is a market for electricity in east where the power is costlier than that in the west.
- The eastern region may not have to use inefficient and old coal fired power if the electricity from clean sources is transported from the west to east.
- The business for electricity transportation between the west and the east will have direct benefit such as employment in the poor areas in the west, in addition to generation of additional revenues in the west arising out of the differential prices between the regions. It is not clear whether the surplus revenues so generated would be passed on to the poorest provinces such as Xinjiang.
- The adverse effect on health and environmental in the eastern region will be reduced if the old and inefficient coal fired plants are closed down in the east.

Against this background, it is logical that the regional transmission project may concentrate of power transmission from west to east, instead of between central and north region.

Traditional project objectives in the type of projects are:

- Improve reliable power supply, thereby, accelerate economic growth
- Project components usually included
- Construction of single circuit 500 kV transmission line,
- Construction of 500 kV substation and 500 kV switching stations
- Expansion of 500 kV substations
- Improved communication system

Poverty reduction objectives could be to

- Improve electricity supply reliability
- Expand access of electricity to areas including rural areas
- Improve governance and regulation
- Reduce health and environmental costs

Suggested additional project scope and design element

- Expansion of rural electrification in the west
- Distribution system reinforcement in poverty counties in the west
- Encourage community participation

- Ease first time constraints
- Private participation in energy services
- Consumer pricing principles
- Subsidy targeting and its delivery
- Mitigating health effects of biomass use, thus reducing the negative impact on health and environment, in the east
- Closure of old inefficient and polluting coal fired plants in the east

Methodology for maximising poverty reduction impact

- Objective tree/cause & effect analysis
- Benchmarking exercise
- PIR
- Macro level impact analysis

Project 6: Urban environment improvement project (2002)

Under the CAP, the project has been classified as ODI with environment being its cross-cutting priority. Urumqui is rated as the fourth most polluted city in the PRC with severe coal-based pollution in winter.

Project objectives

- Provide a clean environment in the city by switching to clean fuel

Project components proposed

- Switch over to clean fuel from coal to gas
- Connection of gas to households
- Treatment of industrial waste water
- Conversion of vehicles from petrol to natural gas

Poverty reduction objectives could be to

- Expand use of modern forms of energy
- Mitigate health and environmental costs

Additional suggested scope and design element

- Consumer pricing principles
- Ease first cost constraints
- Deregulating energy service industry
- Encouraging community participation
- Subsidy targeting and delivery mechanisms

- Private participation in the provision of energy services

Remarks

The project is essentially an environment improvement project. During the PPTA, participatory approach for identification of the poor areas in the city should be carried out.

Methodology for maximising poverty reduction impact

- Value of benefits for different sub projects through "with" or "without" analysis
- Micro level (house hold) impact analysis

Philippines energy portfolio 2001-03

Project 7: Rural Electrification Project

In Philippines, about 9170 barangays (23 per cent of the total) remain unelectrified. Of these, about upto 4000 are being considered for inclusion under the off-grid electrification, remaining under the grid based electrification. The Energy Resources of the Poverty Alleviation (ERPA) program of the Government[62], interalia, include rural electrification, as well as livelihood generation in rural areas through grid based, and non grid based rural electrification. Government's strategy for the grid electrification in rural areas is to make provision for direct government subsidy to finance unviable electrification project (which would be withdrawn eventually with increased consumer density in the area), implement utility efficiency improvement program and reduction of technical losses of the electricity cooperatives, rehabilitation of the existing lines, etc. In contrast, the off-grid solution for the rural electrification includes identification and characterisation of barangays for NRSE application, enhancement and encouragement of private sector participation, implementation of projects through local level participation, delineation of the role of stakeholders, etc. The livelihood and income generating activities through grid based electrification would include enhancement of agriculture and economic productivity through provision of power to infrastructure (such as irrigation system, handicraft machines, refrigeration plants for agricultural products) and provision of providing social benefits by providing power to facilities for household and/or communities

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[62] Based on the discussion with the officials of the Department of Energy, Government of Philippines during the field visit on October 26, 2000.

(such as barangay halls, streetlight, rural health clinics, etc.). In the case of the off grid based livelihood program, it has been envisaged to identify potential livelihood/income generating opportunities through barangays (such as small rural industries, household enterprises).

Under the CAP 2001-03, the *"Rural electrification project"* has been classified as ODI with private sector development as its cross cutting objectives. Thus, the project intends to assist in creating conditions for expansion of the role of the private sector in economic growth: creating conducive "macro economic[63], legal regulatory, trade, market, financial, and social protection environments as well as infrastructure to spur entrepreneurial development and foreign and domestic private investment". The project TA (being financed out of the Japan special fund) of October 2000 however indicated that the project will assist in reducing poverty in selected rural areas through electrification project that will increase efficiency of existing operations, accelerate electrification within the francise areas of select electricity co-operatives, and link those electrification programs to livelihood and rural development projects that will ensure sustainable development.

Poverty reduction objectives

As expressed earlier, rural electrification does not necessarily benefit the poorest of the poor, who cannot afford the electricity or appliances, even if the first cost barriers are removed. Usually, the direct beneficiaries are the wealthier people in the rural area. However, poor gets benefit indirectly through a general rise of income in rural areas through farm and non farm employment resulting from the productive use of electricity. Thus, sufficient care must be taken to ensure that poor, women, etc. do get the benefit from the use of electricity, if required by creating enabling environment. Thus, poverty reduction objectives should be:

- Expand access to electricity
- Ensure fiscal sustainability
- Improve sector governance and regulation

Suggested project scope and design element

- Grid extension
- Grid extension to build a consumer base with appropriate potential for increasing demand

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[63] Staff instructions on loan classification system conforming to the poverty reduction strategy (October 2000)

- Set appropriate tariff, life line tariff
- Metered consumption
- Separate accounts of the utility for Re operation

Off grid solutions

- Standalone PV/battery charged station
- Micro hydro, wind farm, biomass
- Off grid electrification by private parties
- Remove barriers[64], increase off choices by the beneficiaries
- Use of decentralised approach for delivery/local participation
- Community based service providers (operation, management of small distribution grids, billing, collection, monitoring, etc.)
- Encouraging multiple public/private companies to produce and sell electricity by removing barriers for their entry
- Lowering system standards and costs
- Provide consumer credits and connection subsidies for meeting the first cost of access (e.g. utility credit, micro finance, connection subsidies)
- Integrated approach to utilize various infrastructure facilities in the rural areas
- Educational awareness on energy conservation, and environmental management
- Incentives and subsidies for research and study on technologies for power generation in rural areas on commercial basis
- Promotion and dissemination of improved stoves, solar stoves, household biogas digesters, mini/small hydro power, firewood forest plantation/joint forest management

In fact, discussion with the IEEN officials reveal that considerable efforts are being made to orient the project for reduction of poverty in the areas. For instance, the detailed terms of reference for the PPTA include the following:

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[64] Barriers (draft RRP PHI 29505) against wind energy generation include absence of an operational commercial scale wind farm, lack of economic analysis of grid connected wind based power generation, absence of a policy framework to support private sector investments, in wind based power generations. Barrier against biomass energy development include uncertainties about collection and ownership of biomass, poor financial state of most sugar mills and absence of government incentives for sugar mills to invest in baggase fired generators, and diminishing forestry sources as a source of biomass Barriers to solar energy based power generation include uncertainty of appropriate delivery mechanisms, lack of interest of Electric Cooperatives to supply solar power and their week position, lack of intermediaries to finance purchase and installation of solar based systems

- System rehabilitation and upgradation
- New connections within electrified areas
- Barangay selection keeping in mind the project sustainability and overall objectives of poverty reduction. In particular, those barangays will be selected where electrification can generate livelihood and rural development projects.
- Targeting livelihood and development projects towards poor and poorest in the communities
- Measures for removing barriers for accessing electricity
- Grid as well as off grid extension
- Review of national electrification administration
- Involving private sector through joint venture or other arrangements to help improve EC's performance

The methodology being proposed for assessing the poverty reduction impact are the benefit distribution analysis, and poverty impact analysis. However, we suggest, in addition, the following:

- Objective tree/cause & effect analysis
- Benchmarking exercise
- PIR
- Micro level (house hold) impact analysis

Remarks

The direct impacts of off grid solution for energy provision in rural areas are dependent on the institutional setting of the initiative. Small grids (powered by wind or biomass) are better since users pay for services (electricity) as they use; in the case of standalone applications, the users have to pay for the cost of the device (even if subsidized or on credit) and take on technological risk associated with the device as well. The economics of the technology is location dependent. Generally speaking, biomass based systems are always the cheapest, through it should be noted that the world has yet to see a completely reliable, commercially viable biomass-based electricity generation system. The problem with small wind machines is that one needs either batteries or a diesel generator in tandem-a hybrid machine. This increases capital costs, but maximizes reliability of supply while cutting down on operating costs.

The traditional problem has been the ownership and maintenance of the mini grid. They turned out to be too expensive to be run through state electricity boards (state owned public utilities). The ideal institutional setting that one would like is to have them managed entreprenurially – there are some examples of this (using mini hydro) in Nepal. This implies that the local entrepreneur can manage (or source) technical and financial expertise to run and manage the mini grid.

In West Bengal, India, the West Bengal Renewable Energy Development Agency (WBREDA) runs mini grids based on a biomass gasifier and on PV with users paying as much as Rs 10 per kWh. Unfortunately, the financial viability of the system has yet to be worked out – it is managed by state run WBREDA engineers (who are paid by the state).

Project 8: Strengthening transmission system for rural electrification

The project (2003) has been classified as ODI with PSD as its cross cutting objectives.

Traditional Objectives

Improve supply through improved access, and thereby, accelerate economic growth.

Components usually included under the project

- Setting up transmission line, converter stations, electrode lines, substation expansions
- Installation of additional power transformers and circuit breakers
- Development of power trading and pooling software for use with a view to introduce the competitive markets reinforce existing power transmission system
- Improve power system operational efficiency by strengthening load dispatch and communication systems

Poverty reduction objectives

- Improving access to modern[65] energy services
- Improve reliability of power supply
- Improve governance and regulation

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[65] Refers to sources of fuels which are not primitive/traditional (charcoal, wood, dung), and usually produced by commercial firms

Additional suggested project scope and design element

- Rehabilitation of the existing transmission and distribution system in the districts
- Easing first cost constraints: provide consumer credit and connection subsidies, micro finance,
- Tariff reform for affordable power (such as life line tariff) to the poor people
- Metering of power supply at consumer end
- Governance and regulatory reform
- Encourage community participation
- Deregulation of private service providers
- Increased accountability of service provides
- Integration of various infrastructure services
- Deregulate energy service industry
- Empowerment of the communities in rural areas

Methodology for maximising poverty reduction

- Objective tree/cause & effect analysis
- Benchmarking exercise
- PIR
- Macro level impact analysis

Indonesia energy portfolio 2001-03

Project 9: Outer island electrification 1

Under the CAP, the project has been classified as economic growth project. The project is expected to benefit people and communities in outer islands (outside Java-Bali) and economically less developed region. It has been estimated that about 3 million people who did not have access to electricity would be provided such access over a period of three years. At present, Outer Island Electrification Program (OIE) is carried out mainly by PLN (Perusahaan Perseroan (Persero PT Perusahaan Listrik Negara), a national power utility. In addition, there are three rural electric co-operatives (KLPs) which function as vertically independent utilities. Further, there are about over 17000 privately owned and unlicensed micro enterprises in rural areas which sell electricity to a few households (typically 5-25), usually employing a small diesel generator (1-5 kilovolt-ampere), generally availed by well-off households in the area.

Project scope and objectives

- Enlarge power distribution network to connect new consumers
- Increase substation capacities to meet requirements of new power demand
- Implement new transmission lines to remove transmission bottlenecks
- Increase supply using off grid options where economically justified through renewable and indigenous sources
- Establish institutional capacity to manage electricity supply on a sustainable basis
- Implement demand side management to reduce cost of electricity use
- Poverty reduction measures in power supply to make electricity affordable

There is a PPTA (August 2000), which seeks, interalia, formulation of a long term power development strategy and least cost solutions to meet the assessed demand for maximising economic, social, and poverty impact, as well as a realistic five year investment plan for extension of electric supply through expansion, and upgradation of the existing system and construction of new systems. The TA would further identify the highest priority components of the project in terms of poverty impacts, and environmental benefits, provide input for tariff structure, and indicate various measures so that poor in the areas can avail of electricity services.

As stated earlier, the energy development goals that would expand access to electricity, improve reliable electricity supply, ensure fiscal sustainability, improve governance and regulation, and reduce health and environment costs, would have greater impact on poverty reduction outcomes. It seems that the TA is likely to address the issues. However, the Participatory study as suggested in chapter 4 is recommended to be adopted in this case in order to confirm or design the project components after taking into account the perceptions of the sample project beneficiaries. The choice of areas should be based on the poverty concentration including areas such as south Sumatra, central and south Sulawesi, east Nusa Tengara, and Irian Jaya, as well as remote areas[66] may be considered. In addition to the above project components, we suggest that components which would normally address the poverty reduction issues, as argued in chapter 3, may be adopted.

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[66] Remote area is defined as the existence of a set of conditions: heavy dependence on subsistence agriculture, herding and/or gathering by most of the population. Other conditions include poor transportation, absence of connection to reliable, grid based electricity, low usage of other commercial fuels, poor access to health and educational services. Remote areas are not integrated to the rest of the economy (ADBTA no 3056 PRC)

The project has been marked as economic growth under the CAP, which under the ADB's October 2000 classification may have to be re-classified as Other PI projects with economic growth as its cross cutting objectives. There is a considerable scope to orient the project into a project close to PI project, if the identification of poor areas and design of suitable project components are made at the very initial stages.

Methodology for maximising poverty reduction impacts

- Objective tree/cause & effect analysis
- Benchmarking exercise
- PIR
- Micro level (household) impact analysis

Other IEEN projects

Out of the 16 projects in IEEN's 2001-03 portfolio, the remaining 7 projects not discussed above are the following:

- Power Sector SDP-II (Indonesia)
- Outer Island Electrification II (Indonesia)
- Decentralised rural renewable energy development (Kazaksthan)
- Sub regional power transmission link (Karguz republic)
- Environment Improvement (Karguz republic)
- Power rehabilitation II (Tajikistan)
- Rural Electrification (Philippines)

Of the above projects, only two projects namely Power sector SDP II (Indonesia) & Decentralised rural renewable energy development (Kazaksthan) may not fall on the pattern discussed above. We have however analysed the power sector restructuring project (Indonesia) in this chapter as case 5. The observations made therein are applicable in this case as well. The methodology for maximising poverty reduction impact has been discussed in Chapter 3. Similarly, discussions in case 7 are valid in the case of 'Decentralised rural renewable energy development project in Kazaksthan'.

We have not discussed the 29 proposed technical assistance by IEEN'S portfolio 2001-03, as the TA objectives & the methodology could be developed out of the project objectives discussed earlier.

Conclusion

Poverty reduction is now the overarching goal of the Bank's investment in the region. The IEEN has accordingly taken steps in giving orientation of its portfolio towards the same. An analysis of the IEEN's portfolio (Table 5.3) shows that there is a considerable emphasis on the generation and transmission project in the DMC: about 33% of the proposed investment during 2001-03 is expected to flow in these kind of projects.

Table 5.3 IEEN portfolio 2001-03: type of projects

Type	As percent of total project loan
Generation and transmission	32.35%
Rural electrification*	24 12%
Renewables	10%
Environment related project	21.76%
Others	11.76%

*Assuming that outer island electrification project in Indonesia falls in this category

We analyzed in Chapter 3 that efficiently designed rural energy and renewable projects can have maximum impacts on poverty reduction. Accordingly we suggest that there should be an attempt to reorient its portfolio towards this direction in the next programme cycle.

Our analysis of the existing ADB guidelines on poverty reduction shows that the major focus of the strategy is on the ex-ante impact analysis stage. Poverty reduction strategy should be a continuous affair. The emphasis should be not only on ex-ante but ex-post impact of the project. In this context the importance of benefit monitoring is highlighted. For maximum impact of poverty reduction it is suggested that a benefit monitoring exercise based on the parameters developed at the ex-ante stage should be monitored and evaluated at regular intervals both during and after project implementation phase. It may happen that there could be a time lag between the project completion and the visible impact on the poor. In that case the Bank may initiate dialogue with the concerned DMC for appropriate monitoring of the benefits as a part of the poverty reduction strategy in the country. The outcome of such monitoring should be considered while designing the future projects in the concerned DMC.

Appendix I

Field Visits to Central Luzon, Philippines - 16-19 Oct., 2000

Introduction

IEEN is currently undertaking a staff study to examine the ways and means to maximize poverty reduction impacts of its energy projects. The Tata Research Energy Institute (TERI) of India staff along with the ADB official Dr Piya Abeygunawardena, Senior Environment Economist, IEEN, ADB, visited Central Luzon, Philippines from 16-19 October and met with a cross section of stakeholders of ADB supported energy projects[1]. A list of officials as well as other stakeholders met during the field visit is attached as appendix II.

Objective

The basic objective of the visit was to understand attitudes, beliefs and perceptions of a cross section of the stakeholders of ADB supported energy projects in the Central Luzon.

Main Observations

Brief meetings and discussions were held with the officials of the executing agencies such as National Power Corporation (NPC) to have a broader understanding of the project impacts on the poor. Ten beneficiaries were met, and focussed group discussions as well as informal interviews were held. A summary of the main observations is given below while more details about them are given in Appendix 2.

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[1] This visit was overlap with IEEN's loan review Mission comprised of Y. Zhai (Mission Leader), Perry Canlas and Letty Tayag. We acknowledge their support and NPC's hospitality very much. The area covered during the visit include Loan no. 1398 PHI: Northern Luzon Transmission and Generation Project and Loan No. 1288 PHI: Power Transmission Project.

Energy linkages and poverty alleviation outcomes

Energy in various forms is a basic necessity of life to people. The various linkages between energy and the dimensions of poverty[2] (income, capabilities, security and empowerment) were evident in the field:

Income

- Income from business- dependent on electricity, is a source of income for the poor, therefore, electricity is a major vehicle for income.
- Reliable supply of electricity is essential for continued source of income to the people brownouts were reported to be one of the major problems in some of the project area, and also the reason for unemployment and loss in business in some cases).
- Accessibility is a function of affordability and reliability: cost of accessing the services of the modern energy was reported to be high and one of the major reason for not using the services though available.

Capabilities

- Electricity enhances the quality of life: it provides entertainment.
- Higher forms of energy (eg, gas) reduces indoor pollution compared to biomass use, but due to non reliable supply of energy people often resort to traditional forms of energy, leading to loss of productive time (collection).
- Energy is essential for complementary infrastructure (water supply).

Security

- Energy is also viewed as a "source of security" by people (e.g illumination).

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[2] Except a few, most of the beneficiaries belong to higher energy ladder. They belong to the urban periphery of the region. The official (1994) income based poverty line is P 8,885 per person per annum. A typical Philippino poor (income based) household has an average family size of six or more members, headed by a male, household head less than fifty years old,, household head with little or no schooling, more economically active than the rest of the population with substantially higher labour participation rate, lives in a rural area and engaged simultaneously in as many as four or more income earning activities, and that if lives in urban areas, derives income from agriculture, construction, and transport (Baliscan & Fujisaki, edt. 1999).

Empowerment

- Lack of involvement of the people during project designing has led to negative impacts of the project: like accidents and fires in some distribution areas.

Project design issues

- Generation and transmission power projects are by and large growth-oriented projects. These projects generate income directly at the project site through employment of labour. The end beneficiaries are not generally identifiable and spread over the geographical areas, whenever electricity generated or transmitted is fed into the common grid. Thus, the headcount index for determination of poverty reduction impact is not easy.
- The poverty reduction impact of the above projects could be maximum if the distribution components of the electricity supply pertaining to these projects are also strengthened as a part of the original project, subject to financial viability for the new component.
- The beneficiaries of electricity can get maximum benefits if the distribution and the transmission system losses are reduced. This will lower the electricity tariff at the consumer end. However, tariff policies should be suitable designed if the potential benefit is made disproportionate in favour of the poor.
- Participation of people in the distribution of electricity is desirable. Rural cooperative operating through local village groups for some distribution function such as billing and collection, is one of such alternatives.
- If the energy sources are geothermal or other national resources such as hydro, people in the close by areas are compensated for the depletion of national resources.
- Unless tariff and up front costs along with suitable micro credit are suitably designed, many poor people may not afford the modern energy.
- Electric supply to remote areas is often cost ineffective, and thus, requires innovative policy.

Appendix 1:

A list of people met during the Mission

Antonia Lopez, Principal Engineer A, Masinloc Thermal Plant.

Antonio G Milano, Jr, Engineering Specialists B, San Manuel Substation.

Apolinar Mariano, Jr, Control Engineer, San Manuel Substation.

Candido Villanueva, Principal Engineer C, San Jose Substation.

Claudio Fomella, Former Plant Manager, Tayabas Substation.

Conrado R Bartolome, O&M Manager, Masinloc Thermal Plant.

Ed dela Torre, Division Manager, South Luzon Transmission Line Reinforcement Project.

Eugene H Alfonso, Acting Plant Manager, Masinloc Thermal Plant.

George Luceno, Project Manager, Batangas Transmission Reinforcement Project.

Henry Joseph Bambao, Operator/Engineer, Labrador Substation.

Homer Crisologo, Principal Engineer B, Batangas Substation.

Jesse Tampo, In-Charge of Science Information Center and Chemical Laboratory Center, Mak-Ban Geothermal Plant.

Jesus Echon, Sr, President, Samahan Pagkakaisa ng Relocatees ng Bani (SPRV)

Jose Mari S Danao, Supervising Engineer, Projects Evaluation and Review Office, NPC.

Lito Flores, Site Engineer, Zapote Substation.

Malu Edillor, Community Relations Officer, Masinloc Thermal Plant.

Manny Mina, Substation Engineer, San Manuel Substation.

Norberto Dennis Lacap, Principal Engineer B, Masinloc Thermal Plant.

Relly de Leon, Principal Engineer C, Tayabas Substation.

Romeo Espinosa, Site Manager, Sto. Tomas Project Office.

Ronald Cueto, Supervising Engineer, NPC.

Ronald Macalino, Principal Engineer C, Sucat Substation.

Ronaldo David, Special Assistant to Manager, Northern Luzon Transmission Project.

Rosemary E Roldan, Senior Community Relations Analysts, Batangas Transmission Reinforcement Project.

Vic Rodil, Right-of-Way Officer, Batangas Transmission Reinforcement Project.

Vicente de Guzman, Plant Manager, Sucat Substation.

Virgilio S Navarro, Plant Manager, Mak-Ban Geothermal Plant.

Yongping Zhai, Energy Specialist, Energy Division (East), ADB.

Zosimo Carranza, Project Manager, Northern Luzon Transmission and Generation Project.

16 October 2000: L-1288 PHI: Power Transmission Project

The objectives of the project are to expand and improve the transmission networks to increase their power transfer capability and provide adequate system reliability and security in the context of the ongoing generation expansion program, develop DSM oriented power tariff, and enhance the in house engineering capabilities of NPC.

The project components consists of Luzon transmission (erection of 125 km of 500 km transmission line from Tayabas to Dasmarinas, 30.5 km of 230 kV line fro Pagbilao to Tayabas, 21 Km of 230 kV line from Dasmarinas to Zapote and 13 Km of 230 kV line from Binan to Sucat, construction of substations at Tayabas and Zapote substations, and expansion of the substations at Dasmarinas, Binan and Sucat), Mindalco Transmission Transmission (Erection of 142 Km of 69 LV transmission lines, construction of Nasipit substations, expansion of the substations in Tagoloan, Gen Santos, Tindalo, Badas, and Butuan.

During the day, the Laguna Substation Centre AII was visited. The station has 40 employee, of which there is no women employee. Met Mr Joseph Remorosa of Kalayaan, an employee in the substation. He lives in the urban area, owns TV sets, has access to electricity (for which he spends Peso 500), uses gas (for which he spends Peso 250), uses firewood in emergency from his field, and owns refrigerator. He views the electricity as a vehicle for his improved living, although he spends 10 percent of his income in purchasing electricity.

Visited Tayabasa Substation, which employs only two technical persons, and 12 other personnel. Only two shops are seen nearby. The substation is fed by power generating station at Pegbilao, transmits to Laguna, Bulacan, Dasmarinas, etc. It also feeds power to Miralco for distribution through rural cooperatives to the Lucena city/Quezon areas (end customers). The following residents were met:

1) Met Ms Maria San Pedro through the assistance of Mr CR Sumlang, the Barangay Captain of Quezo village. About 700 families reside in the area. The electric appliances in her family include computer, water pumps, electrical ranges, TV sets, radio, refrigerator, cell phone, etc. Her family income is

P 20, 000 per month, of which she spends P 1106 for consumption of electricity. Electricity came to the village about 15 years back. For cooking purposes, she uses gas. She does not use fuelwood, although her father uses the same, which are being collected from the nearby field.

The electricity is supplied by Quezon Electric Cooperative, which charged a tariff of US 12.5 Cents per kWh for the month of August 2000. Ms. San Pedro considers the tariff very high. The brown out in the area is very common: sometimes about 4-5 hours in a day. The children and women are mostly affected due to lack of electricity. Health services, education of children, lighting, and employment (Ms. Padro is self employed) get affected if there are no electricity. The electricity is convenient, but is found to be quite costly. She is however willing to pay more even upto P 1200, if there is reliability of electricity supply. There are electricity meters, and the billing staff collects the data every month. She uses pump for drawing ground water for cleaning, and uses the municipality supplied tap water for drinking.

Ms Maria San Pedro is unable to explain precisely what is meant by "poverty", but stresses that her children should not suffer from "poverty".

She is very critical about the operation of the distribution cooperative. According to her, it does not protect their interests. No dividend of the cooperative has been distributed to the members so far. She felt that:

The high electricity tariff is due to cost to intermediaries (e.g mark up) such as the Electricity Cooperative, and suggested that the NPC should supply electricity directly to the end consumers without routing it through Meralco, and Quezon Rural Cooperative.

Safety of the distribution lines is unsatisfactory. About few years back, about 5 people died due to short circuit fire.

There has been no consultation before the ADB transmission project was undertaken in the area, and the consultation process should be initiated before undertaking such project.

2) Met Ms Aneeta in the Quezon area. She has six children and stays in a single small room. She uses three 100 Watt light bulbs, and has TV, Radio, iron, and rice cooker. She uses gas for cooking, and electricity for other purposes. Her youngest child of 12 years of age, goes to high school, and her eldest son of 33 years old owns a shop next to her house.

The areas are affected by brownouts Without electricity, the most affected person in the family is the woman. Gas is preferred for cooking, and during the electricity brownouts, she uses candles for lighting, which affects her health.

Electricity is used in the areas in health clinics, school, and community centers. Even for community networking, the use of electricity is welcomed.

She is not able to describe what is meant by "poverty", but said that she could feel the same. She felt that cost of electricity is very high, and should be reduced.

They were not consulted before the ADB project was undertaken in the area.

During the visit, it appeared that the distribution authority did not take sufficient care for safety of the residents: electric poles used are of temporary in nature, and wire is connected from the poles to the houses in a vulnerable ways. During 1995, there was a big fire, and it may happen at any time. The distribution segment of the electricity supply needs to be strengthened in the area.

17 October 2000 visit to Batangas Transmission Reinforcement project.

The San Pascual transmission line project is the identified interconnection facility connecting the San Pascual cogeneration power plant to the Luzon power grid through Batangas substation, Batangas city and Calaca swithward within the Batangas coal fired thermal plant in Calaca Batangas province.

About 140 persons within 8 Km T/L right of way from San Pascual to Mahabang Parang in Batangas city would have to be rehabilitated under the project. The compensation consists of, wherever applicable, a) land to be acquired as sites as substations, cable terminal and converter stations and non agricultural lands within the T/L right of way to be paid as replacement costs equivalent to the current fair market value, b) an easement fees for agricultural land along the T/L ROW tracts equivalent to 10 percent of the land's current market value, c) tower occupancy fee equivalent to 100 percent of the current market value of the area, d) compensation for the crops/plants and trees, e) compensation to houses and structures, f) financial assistance to agricultural tenants/occupants of the agricultural lands, and g) disturbance compensation equivalent to daily minimum wages in the project affected areas multiplied by sixty days.

3) Met Ms Nicolas, one of the persons likely to be relocated under the above project. It appeared that the NPC had taken sufficient care to convince her about the size of the compensation package and the importance of the project. She is likely to purchase a land nearby her family.

She feels that the project would help her in establishing business such as eg piggery out of the compensation money. Some persons in the area would set up some business out of the compensation money. NPC has consulted the staff before the relocation package is announced.

Electricity to her is a part of daily necessity. It has economic/infrastructure value: electricity helps running health clinic, school, market building, water system with efficiency. Under the project, the compensation money given by the NPCO would help the relocated people in setting up various business, and this would in turn would generate employment in the areas.

4) Mr Gregorio Marino, employed as Secretary in the Barangay office, owns TV, refrigerator, radio, gas stove, etc. He uses LPG gas for cooking, as well as fuelwood during the non-availability of gas. Fire wood is collected from the field, but trees are re planted for mitigating forest degradation. Fuelwood is easier to collect. He uses kerosene for lighting during electricity brownouts. Sometimes electricity is substituted by fuelwood for cooking.

He has a plot of land for growing vegetables, and has a house plot for residential accommodation. He feels that in Barangay, life without electricity may not stop, but in an urban area, the poor are most affected without electricity.

"Poverty" is described by him as a "situation where the family just meets the subsistence needs, and should not have adequate means to meet the expenses of their children's education, and can not afford to protect their health". Energy can reduce poverty, but, that would depend on the attitude of the people. Energy in his village helps in generating employment through weaving work (in the village, about 1000 people are employed), poultry business, piggery business, etc. The health clinic is using electricity, and helps the poor in addressing their health problems during the operation times, getting the right medicines, etc.

He pays Peso 7 per litre for purchasing kerosene, and peso 200 per month for the consumption of electricity. Water is obtained through water tap supplied by the local authority. He is willing to pay more if there are less brownout, and more availability of reliable power in the area.

4) Met Ms Rosemary of the Social Engineering Department of the NPC. She is in charge of the resettlement schemes under the NPC power project. As a part of the resettlement schemes, the NPC takes into account the confidence of the affected persons, local municipality, Barangay, provincial government, etc, before deciding or awarding compensation money to the re located persons.

She felt that power transmission project assures reliable power, which has many indirect benefits, and it is difficult to identify the direct beneficiaries, once the electricity is put into the common grid via the transmission lines. Some employment could be generated at the time of construction of the transmission project (which may be the direct benefit of the project). In order to make it socially oriented, a) the transmission company should share some benefits to the local Barangay, municipality, or provinces as is being done in Philippines for the generation projects. (Under the Energy Regulation 184 of the Government of Philippines, a electricity generation company is required to pay a certain percentage of its sale's proceeds to the local bodies including the Barangay.) This income sharing by the NPC with the local government/ local bodies may also result in better acceptability of the transmission project to the residents including the poor in the area (over which the project passes), which are often seen by the local residents as projects not belonging to their areas, b) it should work more towards end consumer satisfaction, and therefore, there should be some livelihood component under the transmission project, and c) the transmission project should also have some component in the distribution segment of the electricity system so that end consumers including the poor are benefited by the project.

5) During the visit of the geothermal plants at Bitin Bay, met Mr Eduardes D Onal, and Ms Emeslie S Dabiente. They are working in the multi-purpose cooperative society at Bitin Bay. The cooperative has 150 members, lends money to the members (at 18 percent per annum, and requires collateral for loan beyond Peso 20,000), and buys the products produced by its the members. It was set up in 1992 with the help of the NPC with a grant of P 100,000 and an interest free loan of P 300,000. It makes profit, even after maintaining 23 field workers who work under contract with the geo thermal plant at Bitin Bay for the cleaning services.

In the Barangay adjacent to the geothermal plant, the "National Wealth Tax laws" is applicable, under which the local residents are entitled to get free electricity. Most houses in the area do buy gas for cooking purposes. Use of electric stoves is not allowed by regulations as this affect the transmission of electricity system.

The cooperative is run by an elected Board. So far, four chairmen served the board.

6) Met Mr Domingo Maranan of St Vicente Santo Tomas Batangas. He is a self employed person, buys raw coconut at P 7 per Kilogram, and sells at P 20 per 100 gram of Copra after drying the raw coconut, to the nearby market. After processing 1000 coconuts, he can get about 150 kilogram of copras. He finds that electricity helps him in continuing his work during night for getting coconut from the coconut shell.

He has a house plot, land with fruit bearing trees, and uses fire wood for cooking. Electricity is sparingly used due to its high costs. He pays P 490 per month (minimum being P 300) for the electricity consumed by 6 light bulbs, TV and refrigerator. There are brown out situation in the area. Sometimes, it prolongs for 2 hours, and during the brownout, he uses candles/flash light for his house lighting. The electricity connection costs are very high, and he had to pay P 2000 for that which includes costs covering the costs of meter, and the connecting wire from the poles to the house. His house has a meter, which is read every month, and he pays the electricity bill monthly.

His children are going to school. He feels that electricity helps in children education, and without that, his children can not study during the night. He fetches water from a distance, for which he uses his own motorised transport.

According to him, he belongs to the category of poor people. His definition of poverty encompasses "a situation when he does not have any work, no food, and his incoming is not sufficient to meet his daily needs". His children have to be sent to the school, and if he is unable to do this duty, he should be categorised as a person falling under the poor group.

7) Met Ms Oring Karalipio of Barangay San Tolome, Santo Tomas. She has 9 children, and 12 grandchildren who give her enough support in running the family.

She has various electrical appliances such as fans, light bulbs, TV, refrigerator, radio. She uses firewood as fuel, for which she usually walks over to the nearby forests for collecting the same. She pays P 500 (minimum) and P 800 maximum for the consumption of electricity. Electricity consumption is metered, and bills are paid monthly. The electricity brownout is common in the area, and sometimes it lasts for 4-8 hours. During such brownout, he uses candles for the lighting purposes. Connection charges to the extent of P 3800 had been paid to Meralco, a electricity distribution company in the area.

Her son is working in "ready to wear" factory nearby. If there is no electricity in the area, there would be no work. The raw materials are collected, and are sewn in the factory. The family is willing to pay more if the electricity supply is more reliable. The family recognised the income generating capacity of the reliable electricity supply, as without electricity in the factory, her son does not get any wages.

According to the family, poverty implies a "situation when people are sick, and they can not be given medicine, and can not be shown to the doctor. It also implies a situation when one can not send his children to school".

18 October 2000: Loan Number 1398 PHI: Northern Luzon Transmission and Generation Project

The principal objective of the project was to ensure the reliability of electricity supply in Luzon areas through expansion of NPC's network and generation capacity. The transmission activities are, interalia, needed to integrate the output from Sual and Masinloc power stations with Luzon grid Thus, the project consists of a 88.75 kilometer, 230 kV double circuit transmission line from Masinloc to Labrador; a 22 Kilometer 230 kV double circuit line from Labrador to San Jose; new 230/500 kV substations at Labrador and San Manuel; expansion and upgrading of the 230 kV San Jose substation; installation of the second 300 MW generating set at Masinloc power station.

8) Met Mr Antonio G Milano, Jr. Officer in Charge of the San Manuel substation. The substation has been in operation since January 21, 1999. It gets electricity from the coal fired Masinloc generating station. The substation feeds various distribution companies and NPC. The substation employs 40 people. There are a few pending "right of way" cases under the project.

9) Met Mr F M Cepezo, General Manager, Pangasinan Electricity cooperatives Ltd (Panelco III). The Cooperative gets electricity supply from NPC through its substation San Samuel. There are 87442 (1998) connections. Of this, 60 percent belongs to the residential category, and of this, 85 percent falls under the rural areas. The energy consumption per type of consumers (1998) is: residential 60625 MWH, commercial 22178 MWH, industrial 11971 MWH, public building 2804 MWH, and others 4684.

Since the operation of the San Manuel substation, the consumer satisfaction has gone up, and the demand has increased by 11 percent since last year. This increase has been significant in the rural areas. The average connection in such areas has increased, and the total electricity consumption has also gone up in the area. All rural areas have been electrified, but the actual total connections are only 71 percent (1998).

The electricity is finally distributed to the end consumers through the Barangay Power Association (BPA), whose activity is only restricted to meter reading and collection of money, for which the BPA is paid a discount. The electric line connecting from the substation to the end customers is maintained by the Panelco.

The average tariff is about P 4.70 per kWh, while it purchases the same at P 3.22 per kWh from the NPC. The average connection fee is P 2000. The distribution losses are 16 percent (1998) covering technical and non technical losses. There is no life line tariff, and rich and poor pay at an equal rate. Rate is the same irrespective of the sources of the power. Variation of rates is subject to the approval of the Energy Regulatory Board. Its rates are higher than the Meralco Distribution Company, as Panelco has more rural consumers, and unlike Meralco, it can not cross subside the poor at the expense of the urban customers. So far, the basic rates remain unchanged for the last 5 years, but, the Panelco pays discounts on this rate as a part of the its income dividends to the consumers. Recovery rate from the residential consumers is very good.

Panelco finds it very cost inefficient to supply electricity in remote and isolated areas. In the Annan village, the Panelco has set up 4 Km lines for covering poor customers where the monthly consumption of electricity is less than 50 kWh.

The Panelco has a Social Support Scheme. Under the scheme, scholarship is provided to poor member's family subject to certain criteria, medals are distributed during the graduation ceremony, computers are distributed to the educational institutions, etc.

Every consumer, by virtue of its connection, is a member of the cooperative society. Rather than introducing additional profit earning activities, the Panelco distributes profits through discounts to its members. It is considering to distribute dividends to its members every year, and the details are being worked out.

Mr Cepezo felt that ADB can help the poor people by a) strengthening old distribution substations, b) helping Panelco to reduce distribution losses (technical) thereby allowing the Panelco to charge lower tariff from the consumers, c) helping suitable rehabilitation of poor people, d) creating industrial center in the villages wherein the special lower tariff could be made applicable to those areas surrounding the rural industrial center. In the areas normally served by Panelco, it would be difficult to implement a tariff policy, which could discriminate the consumers on grounds of poverty. It was suggested that the ADB can identify poor areas, build industrial complexes, and then, the Panelco can give lower rates to industrial areas. The Panelco is considering divesting its share upto 40 percent, and making only one seat against such shares in the Board of Management of the Panelco.

Met Ms Kalma, a widow, of the Panelco distribution area, has three children: two are going to school and the other daughter is going to colleges. She is self-employed in fishery business. She buys raw fish from the fish market, smokes them during the wee hours of the day, and sells them to the market everyday. She earns P 400 everyday, which is just enough to meet her expenses towards education of her children.

She uses electricity for lighting the house, and watching TV. She can not afford to purchase refrigerator or rice cooker. She pays P 300 per month for the consumption of electricity. During brownout, she uses candles. She uses gas for cooking, and also uses firewood/charcoal for the same. During summer season, she cuts trees, put them in heaps, and uses them for the above purposes throughout the year. She considers that electricity tariff is very high, and does not want to pay more even if there is reliable power. She recognises that without electricity her business would go down, as the fishing market without electricity would not work, thus reducing her livelihood. Electricity makes her feel safe during the night, helps in the study of her children, during rains, and prevents thief to enter her house. It is very much convenient for her daily use.

She thinks that she is a "poor" person, as she is finding it difficult to support her children's education, especially after the death of her husband.

Met Mr Dinotabula. He does not have any electricity in the house for the last 20 years, although his neighbours have the same. According to him, the connection costs are prohibitive, and he can not afford the same. He uses kerosene lamp (costs P 1.50 per litre) for lighting, and charcoal for cooking. If the connection costs are waived, he would opt for the same. He is a carpenter, and so is his son. He earns P 200-300 per carpentry job. With electricity he would have earned more. He does not consider himself to belong to the lowest category of poor people.

Visited a manufacturing premises, M/s Urdaneta Metal Craft Side unit. It employs 10 staff. It uses electricity for making the frame of the "three wheeled cycle". The owner pays P 2500 for consumption of electricity for the manufacturing business. During brownout, the business suffers. If it is a long brownout, the Panelco gives advance intimation and the employees do not come for the job (the employees work on piece rate system).

Met Ms Agsalud, wife of the incumbent Vice Mayor of the city area. As a part of the residence, she has a printing shop and she employs workers, which during the peak season, increases upto 15 people. The workers are very poor, and without the work, they face problems in the family. The wages vary from P 170-250 per day. If there is no electricity, the employment suffers.

She pays P 3500 every month, for the consumption of electricity in the printing press.

She feels that ADB projects can help the poor if the electricity tariff is lowered. This can be achieved through the reduction of the system losses. A little reduction is normally considered very high by the poor people. Electricity, according to her, is a basic need for her life. Although, poor people prefer food and shelter as priority items, electricity generates employment which keeps the poor sustain in life. Poor crave for electricity, but can not afford the same. In rural areas, for generating employment, electricity is required. In rural areas if employment is generated, people will buy appliances, for which they would require electricity. In her areas, nine out of ten families are poor, and they should be helped. The workers have fan and light bulbs in their houses. Without electricity and thereby without employment, they would fall below the poverty line.

According to her, ADB projects may cover rural areas, or distribution zones which are poor areas, and the distribution system should be strengthened. A cluster of Rural Electricity Cooperatives in poor areas should be considered by ADB for their strengthening. Under a transmission project, a livelihood component may be added for making it more poverty reduction oriented.

19 October 2000. Visit to Masinloc Power station of the NPCO

Met Mr Eugene H Alfonso, Acting Plant Manager, Masinloc Coal Fired Thermal Power Plant The plant has a capacity of 600 MW, which is roughly 30 percent of the total NPC capacity. It is expected to produce 4204 GWH electricity every year when it runs fully. At present, Unit I is running, while the unit II is yet to function fully. Against the unit I capacity of 300 MW, it is working with a capacity of 235 MW.

Under the Energy Regulation 184 of the Government of Philippines, the management is required to set aside P0.01/KWH for development purposes in the local areas for projects to be approved by the Department of Energy. The projects are required to be submitted by the local authority including the Barangay of the area. The details of devolution of funds are yet to be worked out in the Units. The Units employ 294 regular employees, and various contractors who bring many daily wage labourers in the premises.

The Units use Australian coal as input for the power generation. The fly ash generated under the project is bought by a private firm for making porcelain. The unit relocated 300 families during the process of establishing the plant. Met Mr Jesus Echon Sr, President of the SPRV, an association of the relocated residents. The relocation has taken place in an area adjacent to the plant site.

Mr Echon is a self employed person, has one tricycle for transporting people in the area, possesses TV, refrigerator, cooks food by using firewood being collected from the nearby forests. He had earlier 3 hectares of land, 15 mango trees, fish pond, which had been acquired by the authority. The compensation paid to him did not cover the future earnings of the fruit trees, and he is not able to buy new property due to low compensation. Previous to the operation of the plant, he did not use electricity. Now, he consumes monthly electricity worth P 800-1006. He gets drinking water from the tube well. Electricity changed his life pattern in several ways in recent times.

Appendix II

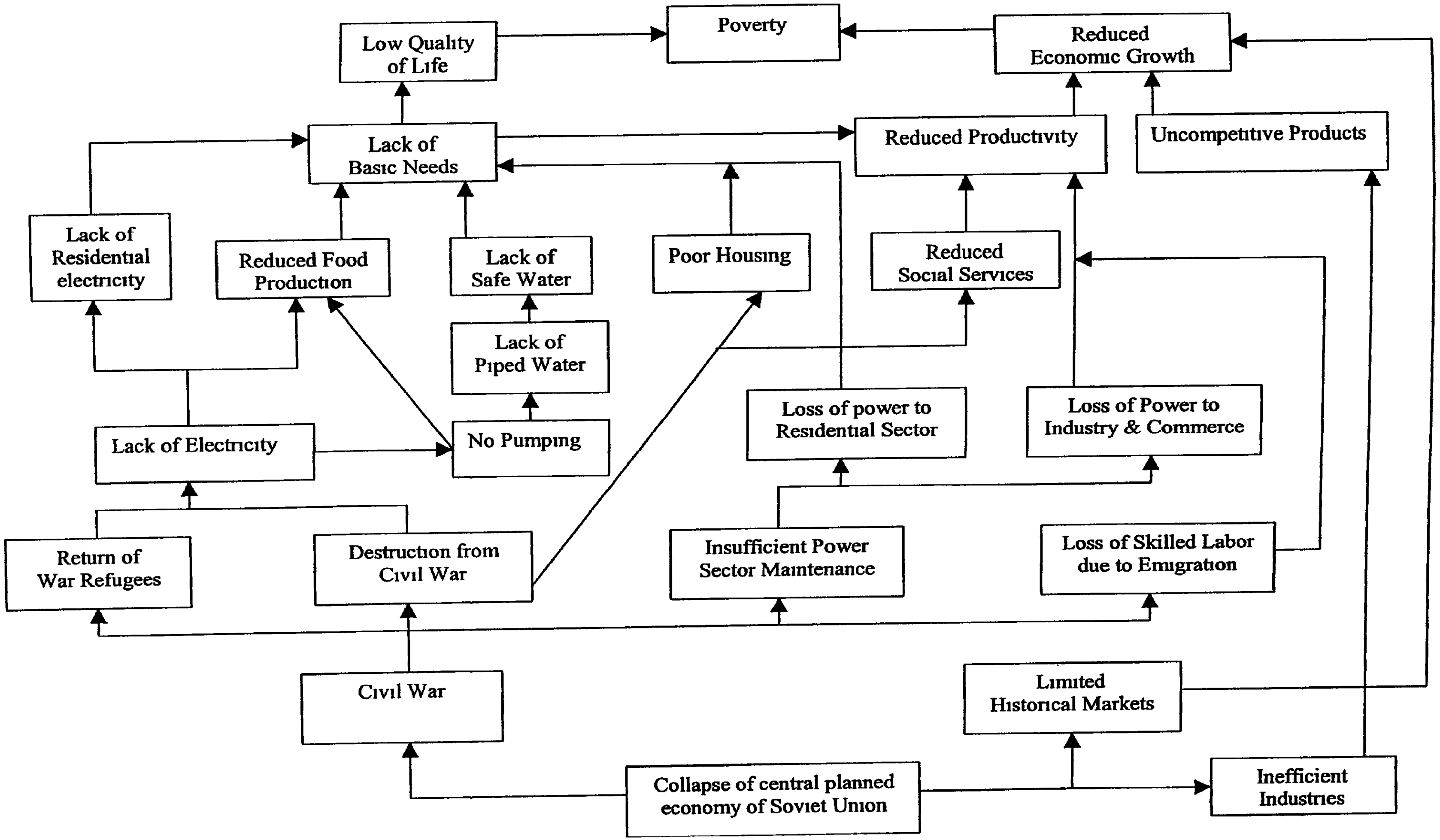
List of officials met in ADB and during field survey in Philippines

S No	Name	Designation	Department	Organisation	Address	Tel	Fax	E-mail / Internet
1	Nelia F Ironta	Manager	Planning Department	National Electrification Administration	NIA Road, Diliman, Quezon City, Philippines 1100	(632) 929-21-61	929-21-61	
2	Tyrrell Duncan	Project Economist	Transport & Communications West Division	Asian Development Bank	6 ADB Avenue, Mandaluyong City 0401 Metro, Manila, Philippines P O Box 789, 0980 Manila, Philippines	(632) 632-6895, 632-5230 (D)	636-2340	tduncan@adb org
3	Anil Terway	Senior Power Sector Specialist	Energy Division (East)	Asian Development Bank	-do-	(632) 632-6412	636-2422	aterway@adb org
4	Carol Litwin	Poverty Reduction Specialist	Energy Division (West)	Asian Development Bank	-do-	(632) 632-5442, 632-6354	636-2335	clitwin@adb org
5	P Abeygunawardena	Sr Economist for Environment	Energy Division (East)	Asian Development Bank	-do-	(632) 632-6363	636-2422	pabeygunawardena@mail asiandevbank.org
6	Halady Satish Rao	Manager	Energy Division (East)	Asian Development Bank	-do-	(632) 632-6379, 632-6381	636-2444, 636-2422/26 (D)	hsrao@adb org
7	C C Yu	Evaluation Specialist	Operations Evaluation Office	Asian Development Bank	-do-	(632) 632-5926, 632-4108	636-2161, 636-2175	ccyu@adb org
8	Nirmal Ganguly	Director's Advisor	Board of Directors	Asian Development Bank	-do-	(632) 632-6177 (D)	632-5780 (D)	nganguly@adb org
9	Nigel C Rayner	Senior Economist	Project Economic Evaluation Division	Asian Development Bank	-do-	(632) 632-6632	636-2365, 636-2444	nrayner@adb org
10	Richard S Bolt	Economist	Project Economic Evaluation Division	Asian Development Bank	-do-	(632) 632-6645, 632-4171	636-2365/2356	rbolt@adb org
11	Rita Ravi Nangia	Senior Evaluation Specialist		Asian Development Bank	-do-	(632) 632-4104, 632-5666	636-2161	mangia@adb org
12	Yongping Zhai	Energy Specialist	Energy Division (East)	Asian Development Bank	-do-	(632) 632-6476, 632-5976	636-2422/2426	yzhai@adb org
13	BO Q Lin	Project Economist	Energy Division (East)	Asian Development Bank	-do-	(632) 632-5634, 632-6461	636-2422	bqlin@mail asiandevbank.org
14	Geoffrey H Wilson	Senior Financial Analyst	Energy Division (East)	Asian Development Bank	-do-	(632) 632-6358 (D)	636-2422	gwilson@adb org
15	Preben Nielsen	Deputy Director	Infrastructure, Energy and Financial Sectors Department (West)	Asian Development Bank	-do-	(632) 632-6347	632-5502	pnielsen@adb org

16	Khaja H Moinuddin	Deputy Director	Infrastructure, Energy and Financial Sectors Department (East)	Asian Development Bank	-do-	(632) 632-6423	636-2420, 632-6318	kmoinuddin@adb.org
17	Omkar Shrestha, Ph.D	Deputy Resident Representative		Asian Development Bank	Bangladesh Resident Mission, BSL Office Complex, 2nd Floor (Sheraton Annex) 1 Minto Road, Dhaka, Bangladesh	(8802) 933 4017	933-4012	oshrestha@mail.asiandevbank org
18	Su Yingsheng	Deputy Director, Senior Engineer		Anhui Provincial Government ADB Project Office	221 Middle Chang Jiang Road, Hefei, Anhui-230001, China	86-551-2602209	86-551-2601424	adb pmo@mail hf ah.cn.
19	Eugene H Alfonso	Acting Plant Manager	Masinloc Coal fired Thermal Power Plant	National Power Corporation	Masinloc, Zambales	(02) 814-9282 0912-800-4071 (M)		www napocor com.ph
20	Rosemary E Roldan	Senior Community Relations Analyst		National Power Corporation	BTRP Extension Office Poblacion, Sto Tomas, Batangas	(043) 7784691 0917-9012568 (M)		RoseRoldan@edsamail com.ph
21	Antonio G Milano, Jr	Engineering Specialist B		National Power Corporation	North Central Plain District (District III), San Manuel, Pangasinan, 2438	(075) 565-3268/3260 0919-3455586 (M)		agmilano@pang pworld net.ph
22	Reuben Emmanuel T Quejas	Chief	Non-conventional Energy Division	Department of Energy Republic of the Philippines	Energy Cebter, Merritt Road, Fort Bonifacio, Taguig, Metro Manila, Philippines	(632) 844-1021 to 40	818-8614	rquejas@doe gov ph

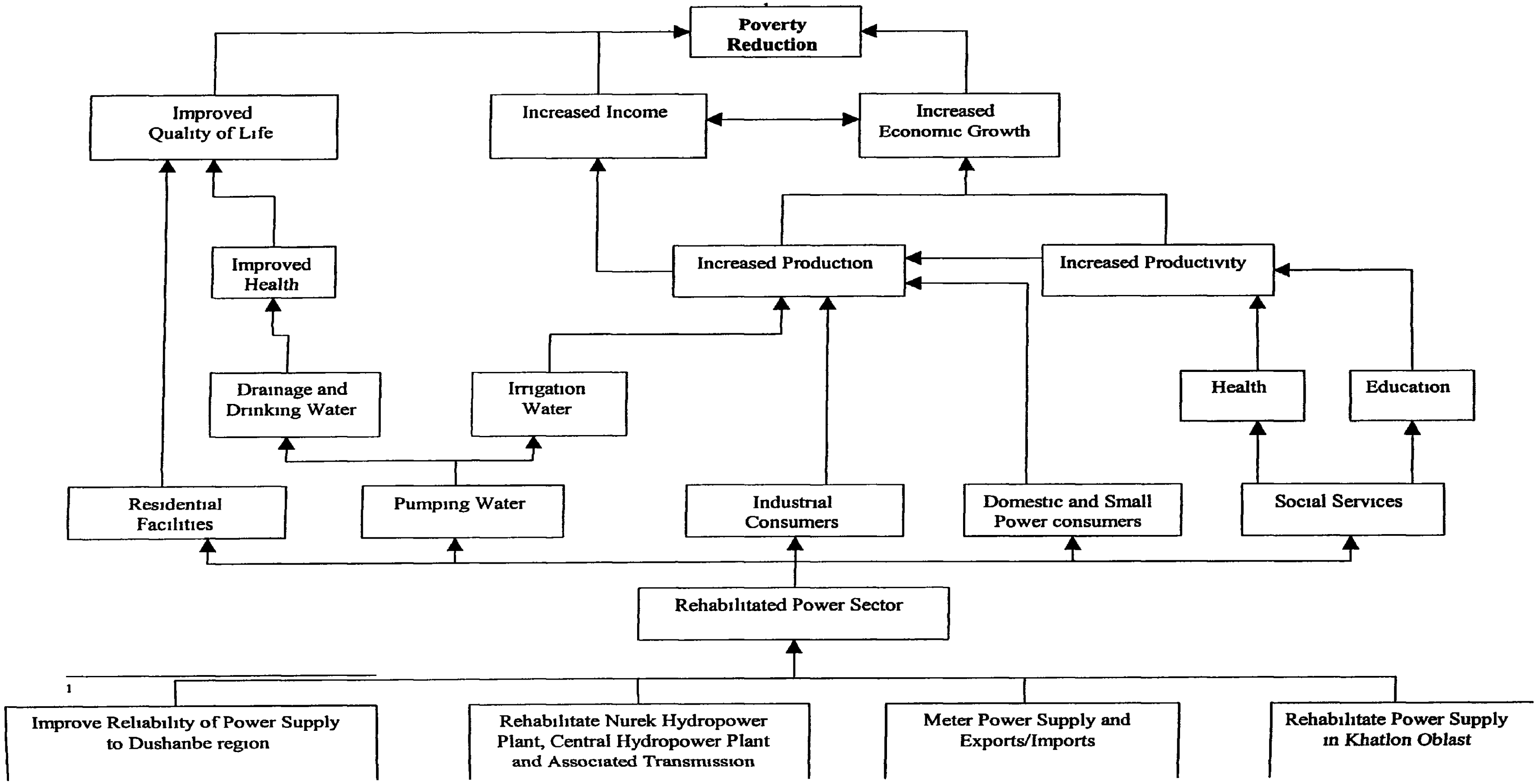
Appendix 111a

CAUSE AND EFFECT ANALYSIS



Appendix III b

OBJECTIVE TREE


Poverty Reduction
Improved Quality of Life
Increased Income
Increased Economic Growth
Improved Health
Increased Production
Increased Productivity
Drainage and Drinking Water
Irrigation Water
Health
Education
Residential Facilities
Pumping Water
Industrial Consumers
Domestic and Small Power consumers
Social Services
Rehabilitated Power Sector
1
Improve Reliability of Power Supply to Dushanbe region
Rehabilitate Nurek Hydropower Plant, Central Hydropower Plant and Associated Transmission
Meter Power Supply and Exports/Imports
Rehabilitate Power Supply in *Khatlon Oblast*

Appendix IV

Project classification

Project tittle/loan number	Project classification				Notes from the RRPs
	Economic growth	Environment	99		
			Stated	unstated	
People's Republic of China for" Qitaihe Thermal Energy and Environmental project" RRP.PRC 26454 (October 94)	Primary	Secondary		*	Project will 1 through the power generated through this project, meet both the demand for both existing and new demand 2. the new cogeneration plant will reduce the coal consumption rate 3 improve air quality by reducing pollution from heating
National power corporation for power transmission reinforcement project, Republic of Philippines PHI 31433 (November 1997)	Primary	Secondary		*	It is mentioned that the main benefit of the project will be 1 expanding and strengthening power supply to enhance reliability 2. it is mentioned (though indirectly) that in that area brownouts were the main reason for economic loss and unemployment and that this project would therefore help in providing a solution to this
Nation power corporation for northern Luzon transmission and generation project, Republic of Philippines PHI 25386 (October 1995)	primary	Secondary		*	In the benefit estimation part it is written that this project will: 1 ensure reliable supply of electricity 2. the beneficiraries will be all consumers in the area and all who derive their livelihood from industries reliant on a stable power supply.
National Power Corporation for "power transmission project, Republic of Philippines PHI 27231(November 1993)	Primary				1 This project is to enhance the reliability of power supply 2 Improve the utilisation capacity of existing hydro power plants 3 Develop DSM oriented power tariffs 4 Enhance inhouse enginering capacity

People's Republic of China Wind power development project PRC 31163 (September 2000)		Primary		The project mentions that the main aim is to 1 produce electricity in an environment-friendly manner by promoting wind based power plants 2 this will help in reducing harmful emissions (like sulphur dioxide, nitrogen oxides and TSP) associated with conventional thermal power generation
Kingdom of Nepal rural electrification, distribution and transmission NEP 29471 (November 1999)	Primary	Category B	*	The project will: 1. provide electricity to 15400 new households in the rural areas 2 improve sector governance , reduce distributional losses, and strengthen the financial position of NEA 3 Improve standard of living and economic development in the project area
People's Republic of China for North East power transmission project PRC 29418	Primary	Category B	*	The benefits of the project are. 1. will provide additional 1200 mega wats of power, enhancing the power supply capability 2 direct beneficiaries of the project will be existing and future industrial, commercial, residential and agricultural consumers in the southern areas of the region 3 increase the coal utilisation capacity and therefore lead to economic development 4. provide direct employment to about 6000 persons during construction
Republic of Indonesia for power development and efficiency enhancement project INO 27365 (October 1995)	primary	Category A		The main aim of the project are to 1 enhance the system efficiency and reliability of power supply through expanding networks and DCCs 2. promote balance regional development through expansion of transmission network in Java and Sumatra and development of hydropower potential in Sumatra, Sulawesi and Java 3 Promote Human resource development through technology transfer 4 Reduce consumption of oil and therefore promote export

Republic of Indonesia for power sector restructuring programme INO 31604 (February 1999)	Economic growth	Category C		The project aims to support the government tackle the economic crisis by 1. Restructuring the power sector and promoting competitive electricity market 2 setting competition in supply of electricity 3. tariff restructuring and increasing the financial viability. 4 Strengthening the regulatory mechanisms in favour of the end consumers
Republic of Indonesia for gas transmission and distribution project INO.22023 (May 1995)	Economic growth			The project will. 1. promote the use of nonexportable natural gas for power generation 2 therefore generate foreign exchangeearning of about $175 million annually 3. reduce sulphur emissions by about 5000 tons per anum 4. reduce carbon dioxide emissions by 30000 tons annually
Peoples Republic of China for Industrial energy conservation and environmental improvement PRC 25091 (August 1992)		Primary		1. Reduce unit energy consumption by strengthening of modern energy and environmental management system 2. Environment benefit through control of gaseous emissions and liquid effluents discharged by the seven plants (through recovery of usable material and eliminationf of hazardous wastes
Republic of Philippines for transmission interconnectionand reinforcement (to NPC)		Category A	primary	The project wil provide high priority transmission facilities and thereby 1. meet the incremental demand for residential and industrial consumers of one of the poorest region (Mindanao) 2 increased availability of electricity will lead to job creation and increase in household income 3 will improve the delivery mechanisms of basic health and education facilities

Republic of Tajikistan for power rehabilitation project TAJ 32513 (September 2000)	*Category B*	*Primary*	*The project area identifed has suffered severely from the war and political turmoil, this project will improve peoples quality of life and support poverty reduction by* *1 increasing the availability of electricity(to around 240000 poor households)* *2 provide reliable supply of electricity in an environment friendly way (thereby increase the capability and job oppurtunity and therefore increase in income)* *3. access to electricity will also improve the health conditions, save time especially for the women and children*

Appendix IVb

Benchmarking the IEEN projects: the rationale of the scores assigned

Project	Score	Rationale of score
Transmission connection and reinforcement (PHI OCR 2000)		
- Benchmark 1	2	Though the project RRP has not undertaken an objective tree and cause effect analysis of projects, it describes the various poverty related issues at the national level and discussed in details which are expected to benefit various unidentifiable beneficiaries.
- Benchmark 2	2	The RRP has identified 40% of poor beneficiaries will be the target, however no other attempt has been made to include poverty reduction target in project design and site selection
- Benchmark 3	1	No participatory exercise has been undertaken on the same
- Benchmark 4	2	The RRP mentions offhandedly that the project is expected to address good governance, however nothing more has been mentioned regarding the specificity of the same
- Benchmark 5	1	No mention in the RRP about how the project will mitigate the negative impacts of the project on poverty reduction if any.
- Benchmark 6	2	A qualitative analysis has been done only.
- Benchmark 7	4	PIR has been undertaken (37.5%)

Sixteenth power (Masinloc thermal power) project loan (1042-PHI)		
- Benchmark 1	1	No mention of the objective tree and the cause and effect analysis in the RRP
- Benchmark 2	4	The RRP mentions about the settlement plan, p 1.86 million to be administered by the relocatee association to be used exclusively by the resettled person. NPC will relocate a certain % of its fund for development purposes of the relocatees
- Benchmark 3	1	No such exercise has been done, and the RRP mentions this lacunae - ie public consultation should have been done, livelihood programmes not designed in a participatory manner
- Benchmark 4	3	Refer to rationale of benchmark 2
- Benchmark 5	1	No mention of the same in the RRP
- Benchmark 6	1	No mention in the RRP PIR analysis undertaken
- Benchmark 7	3	
Wind power development project (PRC 2000)		
- Benchmark 1	2	Some indirect link has been established between environment poverty and energy, however no objective tree or cause and effect analysis has been done
- Benchmark 2	2	No target beneficiaries in the project are known, but the RRP mentions that off grid electricity to poor communities will be undertaken
- Benchmark 3	1	No participatory study was undertaken

- Benchmark 4	1	No mention of the same in the RRP
- Benchmark 5	2	The RRP mentions that the environmental benefits of the project will be positive on the poor, however no specific analysis has been undertaken Indirect and qualitative statements are mentioned
- Benchmark 6	2	PIR has been undertaken
- Benchmark 7	3	
Power Rehabilitation project (TAJ 2000)		
- Benchmark 1	4	Both the cause and effect analysis and the objective tree have been constructed.
- Benchmark 2	4	Project beneficiaries are identified (especially the project has been designed to cater to the population below the poverty line)
- Benchmark 3	4	A detailed participatory exercise has been carried out in the project area
- Benchmark 4	4	The project has been so designed to cater to policy reforms
- Benchmark 5	4	The project design has ensured that there is no indirect negative impact on the poor
- Benchmark 6	3	No mention of data base for the same
- Benchmark 7	4	PIR has been done
Power restructuring porgramme In Indonesia (RRP INO-31604)		
- Benchmark 1	3	The RRP carried out a poverty impact analysis
- Benchmark 2	2	Vaguely mentioned in the RRP that a social development fund

- Benchmark 3	1	No participatory exercise has been undertaken
- Benchmark 4	2	The RRP mentions vaguely about the social development fund and the retrenchments packages
- Benchmark 5	3	The RRP has done the impact analysis on the poor and have mentioned the positive and the negative impacts ,however it has not talked about the mitigation efforts
- Benchmark 6	1	No mention of any such database
- Benchmark 7	NA	PIR is inapplicable to this case study

PHILIPPINES-2000

MARKET ASSESSMENT FOR RURAL ELECTRIFICATION

Barangay Survey Questionnaire Form

Barangay ID No	Q1 0			
1 1 Time Started (hh mm)	Q1 1			AM PM
1 2 Time Finished (hh mm)	Q1 2			AM PM
1 3 Name of Barangay Captain	Q1 3			
1 4 Name of Respondent	Q1 4			
1 5 Position of Respondent in the barangay	Q1 5			

				Code
1 6 Region	________________		Q1 6	
1 7 Province	________________		Q1 7	
1 8 Municipality	________________		Q1 8	
1 9 Barangay	________________		Q1 9	
1 10 Sitio	________________		Q1 10	
1 11 Type of barangay	[1] = Inland [2] = Upland	[3] = Coastal [4] = Island Barangay	Q1 11	

NOTE

1 Coding number must be assigned to region, province, municipality, barangay and sitio These coding numbers are listed in the supervisor's manual

2 The following codes apply to all questions in this survey form

Coding: **[-7] = Does not apply**
[-8] = Do not know

3 Do not leave any box blank For example in **SECTION 3**, if the barangay does not grow rice, enter "0" in the box for **Q3.1a**, then fill in "-7" for **Q3.1b**

To the interviewer

Please describe how you traveled to the sampled barangay from the nearest town Indicate the mode of transportation used and the time spent for each mode For example, from the town proper you take the jeepney in going to the barangay center for 30 minutes, then ride the single/motorcycle for 20 minutes, then walk for 45 minutes to reach the respondent household Write this down on the last page

---

CERTIFICATION

I certify on my honor that this interview was conducted by me honestly and completely and if found guilty of falsifying the interview, will be subject to forfeiture of allowances

________________	________________
Date of Interview	Signature Over Printed Name of Supervisor
________________	________________
Date Reviewed	Signature Over Printed Name of Head Supervisor

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 2. GENERAL CHARACTERISTICS

This section must be filled with current (1999) data from yearbook and other secondary sources if available such as current barangay records, otherwise, get data from respondent Data to be collected for this section for all 300 barangays must come from the same source and year

2.1	What is the total land area (in hectares) of your barangay?	Q2.1	☐
2.2	How far (in km) is your barangay from the poblacion/town center? *(If less than 1 kilometer, indicate the fraction)*	Q2.2	☐
2.3	How far (in km) is the barangay from the nearest city? *(If less than 1 km, indicate the fraction)*	Q2.3	☐
2.4	What is the approximate distance between the barangay and the town market in km? *(If less than 1 km, indicate the fraction)*	Q2.4	☐
2.5	What is the Internal Revenue Allocation (IRA) of your barangay (in pesos)?	Q2.5	☐
2.6	What is the total population of your barangay?	Q2.6	☐
2.7	What is the total number of households living in your barangay?	Q2.7	☐
2.8	What is the average number of members per household?	Q2.8	☐
2.9	How is the distribution of households in your barangay?	Q2.9	☐

Code. [1] = One main cluster (10 or more households) and the rest are dispersed
[2] = Two to five (2-5) clusters (with at least 10 households per cluster)
[3] = More than 5 clusters (with at least 10 households per cluster)
[4] = Many small clusters (with 5 to 9 households per cluster)
[5] = Dispersed (households are scattered or no distinct clustering pattern)

2.10	Total number of clusters in the barangay	Q2.10	☐
2.11	Average number of households in one cluster	Q2.11	☐
2.12	How many households are there in the biggest cluster?	Q2.12	☐
2.13	What is the approximate distance (in km) of the barangay to the nearest tapping point (electrical post)? *(If less than 1 kilometer, indicate the fraction)*	Q2.13	☐
2.14	What is the approximate distance (in km) to the nearest gasoline station or market to buy diesel or gasoline?	Q2.14	☐
2.15	What is the MAIN source of potable water of the barangay?	Q2.15	☐

Code: [1] = Stream, rivers, lake
[2] = Open well
[3] = Tubed/piped well
[4] = Community stand pipe system
[5] = Water vendor/peddler
[6] = Spring water
[7] = Others, specify __________

2.16	What is the **MAIN** source of energy for water supply in the barangay?	Q2.16	☐

Code [0] = None
[1] = Diesel/gasoline generator
[2] = Solar PV system
[3] = Wind system
[4] = Micro-hydro
[5] = Electricity from cooperative
[6] = Others, specify __________

SECTION 3 SOCIO-ECONOMIC INFORMATION

Crops: *Fill in percent (proportion of households in barangay) engaged in growing the following crops and the average area planted per household*

	Crops	Percent of HH engaged	Average area/household (hectares)
3.1	Rice	☐ Q3 1a	☐ Q3 1b
3.2	Corn	☐ Q3 2a	☐ Q3 2b
3.3	Coconut	☐ Q3 3a	☐ Q3 3b
3.4	Tubers, root & bulbs	☐ Q3 4a	☐ Q3 4b
3.5	Vegetables	☐ Q3 5a	☐ Q3 5b
3.6	Fruit bearing trees/banana	☐ Q3 6a	☐ Q3 6b
3.7	Other crop, specify ____________	☐ Q3 7a	☐ Q3 7b
3.8	Other crop, specify ____________	☐ Q3 8a	☐ Q3 8b

Livestock and Poultry: *Fill in percent (portion of households in barangay) engaged in raising and the total number of each livestock in barangay listed below*

	Livestock	Percent of HH engaged	Total number of heads
3.9	Swine/Pig raising	☐ Q3 9a	☐ Q3 9b
3.10	Cattle raising	☐ Q3 10a	☐ Q3 10b
3.11	Chicken/broiler production	☐ Q3 11a	☐ Q3 11b
3.12	Duck raising	☐ Q3 12a	☐ Q3 12b
3.13	Other animal, specify ____________	☐ Q3 13a	☐ Q3 13b
3.14	Other animal, specify ____________	☐ Q3 14a	☐ Q3 14b

SECTION 4. LIVELIHOOD ACTIVITIES

Please indicate the number of establishments in the barangay engaged in livelihood activities listed below and the type of fuel/power utilized to do the activity Use coding below for main source of energy being used

Coding for main source of energy being used

[1] = Kerosene
[2] = Diesel
[3] = Gasoline
[4] = LPG
[5] = Generator (diesel/gasoline)
[6] = Fuelwood
[7] = Lumber waste
[8] = Car batteries
[9] = Charcoal
[10] = Biomass residues
[11] = Sun (pavement)
[12] = Solar PV system
[13] = Wind system
[14] = Others specify ______

	Activity	Number of establishments	Main source of energy
4 1	Grain mill (capacity = 5 cavans of grain or less per hour)	Q4 1a	Q4 1b
4 2	Grain mill (capacity = 6 - 10 cavan of grain per hour)	Q4 2a	Q4 2b
4 3	Grain mill (capacity = 20 cavan or more of grain per hour)	Q4 3a	Q4 3b
4 4	Copra drying (1,000 nuts or less from 12 hrs)	Q4 4a	Q4 4b
4 5	Copra drying (between 1000 to 2000 nuts for 12 hours)	Q4 5a	Q4 5b
4 6	Copra drying (2,000 or more nuts for 12 hours)	Q4 6a	Q4 6b
4 7	Grocery/sari-sari store	Q4 7a	Q4 7b
4 8	Eatery/food stall	Q4 8a	Q4 8b
4 9	Repair/vulcanizing shop	Q4 9a	Q4 9b
4 10	Handicraft (shell craft, weaving, pottery)	Q4 10a	Q4 10b
4 11	Salt making	Q4 11a	Q4 11b
4 12	Tobacco-flue curing	Q4 12a	Q4 12b
4 13	Furniture making	Q4 13a	Q4 13b
4 14	Charcoal making	Q4 14a	Q4 14b
4 15	Fish/food processing/drying	Q4 15a	Q4 15b
4 16	Others, specify ____________________	Q4 15a	Q4 15b

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 5. BOAT/SEA FISHING ACTIVITY

5 1 What percentage of households in the barangay is engaged in commercial /boat fishing? Q5 1 ☐

Enter "0" if no household in the barangay is involved in fishing and enter "-7" for the remaining boxes, then go to SECTION 6

5 2 How important is sea fishing to the economy of barangay? Q5 2 ☐

Code
[1] = Very important
[2] = Important
[3] = Somewhat important
[4] = Not important

5 3 What type of fishing vessel are they usually using? Q5 3 ☐

Code
[1] = Motorized boat
[2] = Banca (not motor powered)
[3] = Both

5 4 What is the main type of fuel used? Q5 4 ☐

Code
[1] = Diesel
[2] = Gasoline
[3] = Others, specify ______________

5 5 What is the typical storage facility used? Q5 5 ☐

Code
[0] = None
[1] = Individual refrigerator
[2] = Communal refrigerator
[3] = Solar Refrigerator
[4] = Communal cold storage with ice
[5] = Individual cold storage with ice
[6] = Others, specify ______________

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 6. AVAILABILITY OF FUEL/ENERGY SERVICES

For each of the energy sources listed below, please indicate whether it is available to the general public. Use coding below for level of availability

Availability to general public

[0] = Not available
[1] = Available in less than 3 months in a year
[2] = Available between 3 to 6 months in a year
[3] = Available between 6 to 10 months in a year
[4] = Available for 11 months or all year round

What is the level of availability for the following fuels within the barangay?

6.1	Kerosene	Q6.1	
6.2	Diesel	Q6.2	
6.3	Gasoline	Q6.3	
6.4	LPG	Q6.4	
6.5	Fuelwood/Lumber waste	Q6.5	
6.6	Biomass residues	Q6.6	
6.7	Dry cell batteries	Q6.7	
6.8	Charcoal	Q6.8	
6.9	Candle	Q6.9	
6.10	Others, specify ____________	Q6.10	

Is there any renewable energy systems being used by any HOUSEHOLD in your barangay?

Code [0] = NO
[1] = YES

6.11	Solar PV system	Q6.11	
6.12	Wind system	Q6.12	
6.13	Electricity from Micro-hydro	Q6.13	
6.14	Other renewable energy, specify ______________	Q6.14	

Battery Charging Services within the Barangay

6.15	How many households in the barangay are using storage batteries for lighting?	Q6.15	
6.16	How many households/shops are engaged in battery charging services in your barangay? *Enter "0" for none and "-7" for the remaining boxes, then go to Q6.19.*	Q6.16	
6.17	What is the average price (in pesos excluding transport cost) per charging?	Q6.17	
6.18	What is the main source of energy for battery charging?	Q6.18	

Code: [1] = Gasoline/diesel generator [3] = Micro-hydro
[2] = Solar PV system [4] = Others, specify ________

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 6. AVAILABILITY OF FUEL/ENERGY SERVICES, CONTINUED .

Battery Charging Services in the Nearby Barangay
"Nearby" refers to location where households in your barangay could use the services

6.19 How many shops are engaged in battery charging services which are located in accessible/reachable nearby barangay? Q6.19
Enter "0" for none and "-7" for the remaining boxes then go to Q6.24

6.20 What is the average price (in pesos excluding transport cost) per charging? Q6.20

6.21 What is the distance (in km) to the nearest battery charging service station? *(If less than 1 kilometer, indicate the fraction)* Q6.21

6.22 How much (in pesos) is the transportation cost from your barangay to the nearby barangay? Q6.22

6.23 What is the main source of energy for battery charging? Q6.23

Code [1] = Gasoline/diesel generator
[2] = Solar PV system
[3] = Electricity from cooperative
[4] = Micro-hydro
[5] = Others, specify ________________

Generator Supplied Electricity

6.24 How many households have gen-set? Q6.24

6.25 In what year was the gen-set first operated to supply electricity to the barangay? Q6.25

6.26 How many households use electricity from all the gen-set? Q6.26

6.27 On the average, how much (in pesos) is the monthly charge? Q6.27

6.28 What is the distance (in km) to the nearest gas station/market to buy diesel/gasoline? Q6.28
(If less than 1 kilometer indicate the fraction)

Grid Connection

6.29 Is there any household in your barangay connected to the grid? Q6.29

Code [0] = NO [1] = YES

6.30 How many households are connected? Q6.30

6.31 In what year was the first household connected to the grid? Q6.31

6.32 What is the cost (in pesos) per kWh? Q6.32

6.33 What is the full name of the electric company/utility servicing the barangay?
(*Example*, **Cebu Electric Cooperative II**)

Q6.33

SECTION 7 AVAILABILITY OF EDUCATION, HEALTH AND OTHER SERVICES

For each of the following type of school, please indicate the number of educational institutions present within the barangay Indicate as well the main source of power

Source of Power
[0] = None
[1] = Diesel/gasoline generator
[2] = Solar PV system
[3] = Wind system
[4] = Micro-hydro
[5] = Others specify ________

	Educational Institutions	**Number**	**Source of Power**
7 1	Day care public	Q7 1a	Q7 1b
7 2	Pre-school private	Q7 2a	Q7 2b
7 3	Elementary public	Q7 3a	Q7 3b
7 4	Elementary private	Q7 4a	Q7 4b
7 5	Public high school	Q7 5a	Q7 5b
7 6	Private high school	Q7 6a	Q7 6b
7 7	Vocational school	Q7 7a	Q7 7b
7 8	Other, specify	Q7 8a	Q7 8b

For each of the following type of services/clinics/hospitals available in the community, please indicate the number present within the barangay Enter "0" for ***none*** *and "-7" for succeeding questions Indicate as well the main source of power*

Source of Power
[0] = None
[1] = Diesel/gasoline generator
[2] = Solar PV system
[3] = Wind system
[4] = Micro-hydro
[5] = Others, specify________

	Health	**Number**	**Source of Power**
7 9	Private medical clinic	Q7 9a	Q7 9b
7 10	Government hospital	Q7 10a	Q7 10b
7 11	Barangay health center	Q7 11a	Q7 11a
7 12	Others, specify ________	Q7 12a	Q7 12b

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 7 AVAILABILITY OF EDUCATION, HEALTH AND OTHER SERVICES, CONTINUED...

For each of the following type of commercial/financial organization available in the community, please indicate the number present within the barangay. Enter "0" for none and "-7" for the succeeding questions

	Commercial/Financial Organization	**Number**	**Source of Power** [0] = None [1] = Diesel/gasoline generator [2] = Solar PV system [3] = Wind system [4] = Micro-hydro [5] = Others, specify__________
7 13	Banks	☐ Q7 13a	☐ Q17 13b
7 14	Cooperatives	☐ Q7 14a	☐ Q7 14b
7 15	Private lending institutions	☐ Q7 15a	☐ Q7 15b
7 16	Pawnshops	☐ Q7 16a	☐ Q7 16b
7 17	Permanent public market	☐ Q7 17a	☐ Q7 17b
7.18	Others, specify__________	☐ Q7 18a	☐ Q7 18b

Please indicate the availability and cost of the following mode of transportation that are currently available in your community. Enter "0" if the mode of transportation is not available, then "-7" for one-way fare.

	Mode of transportation from poblacion to the barangay center	**Availability** [0] = Not available [1] = Available	**One-way fare (P)**
7 19	Jeep/Car	☐ Q7 19a	☐ Q7 19b
7 20	Tricycle/Motorcycle	☐ Q7 20a	☐ Q7 20b
7 21	Boat	☐ Q7 21a	☐ Q7 21b
7.22	Cart	☐ Q7 22a	☐ Q7 22b
7.23	Animal riding (Horse, carabao)	☐ Q7 23a	☐ Q7 23b
7 24	Others, specify________________	☐ Q7 24a	☐ Q7 24b

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 8. RECREATIONAL FACILITIES WITHIN THE BARANGAY

*To answer the source of power ("b" **question series** or the last column) if there are more than one facility present, enter energy used by the facility that is the largest in the barangay. Enter "0" for **none** and "-7" to the last column*

Source of Power

[1] = Diesel/gasoline generator
[2] = Solar PV system
[3] = Wind system
[4] = Micro-hydro
[5] = Others specify ________

	Facilities	**Number**	**Source of Power**
8 1	Movie house	Q8 1a	Q8 1b
8 2	Private VCR facilities	Q8 2a	Q8 2b
8 3	Cabaret	Q8 3a	Q8 3b
8 4	Beer garden	Q8 4a	Q8 4b
8 5	Billiard/Pool	Q8 5a	Q8 5b
8 6	Others, specify ____________	Q8 6a	Q8 6b

SECTION 9. DEVELOPMENTAL PROJECTS IN THE BARANGAY

9 1 Are there electricians present in the area? Q9 1

Code [0] = NO [1] = YES

9 2 Are there agricultural extensions servicing the barangay? Q9 2

Code [0] = NO [1] = YES

Present Developmental Projects in the Barangay

Please enter the name of any developmental projects currently being undertaken in the barangay (including physical, social infrastructure health projects) Please include also the type of projects and the name and type of agency (NGO or government international multi and bilateral) which is carrying out such development projects Enter "-7" if no developmental project is currently being implemented

Project 1

Name of project

Type of project.

Description of project

Name of administering agency or organization

Type of agency or organization

Project 2

Name of project·

Type of project·

Description of project:

Name of administering agency or organization

Type of agency or organization

Project 3

Name of project.

Type of project

Description of project.

Name of administering agency or organization

Type of agency or organization

Project 4

Name of project

Type of project:

Description of project:

Name of administering agency or organization

Type of agency or organization

Project 5

Name of project

Type of project:

Description of project:

Name of administering agency or organization:

Type of agency or organization

Note Type of project may include roads/bridges recreational facilities, livelihood projects, environmental conservation, health services, water supply project, energy/electrification, etc
The type of administering agency could be the government, NGO, international, bilateral/multilateral, etc

SECTION 10. LOCAL ORGANIZATION

Are the following local organizations present in the barangay?

Code [0] = NO
[1] = YES

10 1	Government agencies	Q10 1	☐
10 2	Non-government organization (NGO)	Q10 2	☐
10.3	Farmers' cooperative	Q10 3	☐
10 4	Women organization	Q10 4	☐
10 5	Religious organization	Q10 5	☐
10 6	Other organization, specify ____________________	Q10 6	☐

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 11 DEVELOPMENT NEEDS OF THE BARANGAY

Listed below are a number of possible services, development or improvements that could be implemented in your barangay. Please rank each service according to priority. Write [1] for first priority, [2] for second and so on

11.1 Clean potable water
(Malinis na tubig inumin) Q11.1 ☐

11.2 Electricity
(Kuryente) Q11.2 ☐

11.3 Educational facilities
(paaralan/iskwelahan, guro, atbp.) Q11.3 ☐

11.4 Irrigation
(Patubig sa mga pananim) Q11.4 ☐

11.5 Roads, bridges & other infrastructure
(Kalsada,tulay atbp. imprastraktura) Q11.5 ☐

11.6 Public transportation
(Pampasaherong sasakyan) Q11.6 ☐

11.7 Health facilities
(Klinika/center, doktor, nurse, etc.) Q11.7 ☐

11.8 Job opportunities
(Pangkabuhayan/trabaho) Q11.8 ☐

11.9 **Others, specify** ____________________ Q11.9 ☐

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 12. ENERGY SUPPLY

This portion must be asked to a representative/supplier of each of the fuel type available within the barangay ONLY For each fuel available in the barangay please indicate the price per unit and amount sold per week ***FOR THE NUMBER OF SUPPLIERS, THIS SHALL BE ASKED TO THE BARANGAY CAPTAIN. IF NONE, ENTER "0" AND "-7" TO "b" AND "c" SERIES QUESTIONS.***

Note *For charcoal, indicate price per unit and amount sold in kg for dry cell and car batteries per piece, diesel gasoline and kerosene in liter*

	Type of fuel	Number of Supplier	Price per unit	Amount sold per week
12 1	Charcoal (pack)	☐ Q12 1a	☐ Q12 1b	☐ Q12 1c
12 2	Kerosene (liter)	☐ Q12 2a	☐ Q12 2b	☐ Q12 2c
12 3	LPG (7kg)	☐ Q12 3a	☐ Q12 3b	☐ Q12 3c
12 4	LPG (11 kg)	☐ Q12 4a	☐ Q12 4b	☐ Q12 4c
12 5	Dry cell batteries	☐ Q12 5a	☐ Q12 5b	☐ Q12 5c
12 6	Diesel	☐ Q12 6a	☐ Q12 6b	☐ Q12 6c
12 7	Gasoline	☐ Q12 7a	☐ Q12 7b	☐ Q12 7c
12 8	Others, specify ______________	☐ Q12 8a	☐ Q12 8b	☐ Q12 8c

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 13 PERCEPTION/ATTITUDE

13.1 Is it possible for the households in your barangay to organize themselves to form a cooperative or organize groups to handle new developmental projects in the area? Q13.1

Code: [0] = NO, *go to Q13.3*
[1] = YES

13.2 If yes, what type of organization? (*please specify*)

Q13.2

13.3 Do you have enough manpower to operate and maintain such developmental projects? Q13.3

Code. [0] = NO
[1] = YES

13.4 Are the technical expertise or level of knowledge in your constituents in the area enough to implement and maintain such developmental projects like operation of electrical service etc? Q13.4

Code [0] = NO
[1] = YES

13.5 Would you be willing to cooperate with an NGO or any developmental firm to implement projects that the barangay needs? Q13.5

Code [0] = NO
[1] = YES

13.6 Are there any interest groups or private entities in your area willing to implement such developmental projects? Q13.6

Code [0] = NO
[1] = YES

13.7 If yes, indicate the name and type of private entity or interest group. Please specify.

13.7a Name Q13.7a

13.7b Name Q13.7b

Please indicate the potential livelihood industries in the area (For example, if the barangay has abundant supply of bamboo, bamboo furniture making can be the potential industry or if there is an abundant supply of fish, village level processing of fish can be the potential industry)

13.8 Specify Q13.8

13.9 Specify Q13.9

13.10 Specify Q13.10

A. Description of Transportation Modes to the Barangay from the Nearby Town

B. Comments/Remarks/Overall Impression on the Barangay

PHILIPPINES - 2000

MARKET ASSESSMENT STUDY FOR RURAL ELECTRIFICATION

Household Survey Questionnaire Form

Household ID No	Q1 0			
1 1 Time started (hh mm)	Q1 1			AM PM
1 2 Time finished (hh mm)	Q1 2			AM PM

				Coding No
1 3 Region	______________________		Q1 3	
1 4 Province	______________________		Q1 4	
1 5 Municipality	______________________		Q1 5	
1 6 Barangay	______________________		Q1 6	
1 7 Sitio	______________________		Q1 7	
1 8 Type of barangay	[1] = Inland [3] = Coastal	[2] = Upland [4] = Island barangay	Q1 8	

NOTE 1 Coding number must be assigned to region, province, municipality, barangay and sitio These coding numbers are listed in the supervisor's manual

2 The following codes apply to all questions in this survey form

Coding: **[-7] = Does not apply**
[-8] = Do not know

3 Do not leave any box blank For example in **SECTION** 3, if the household does not have any farm tractor, enter "0" in the box for **Q3.2a,** then fill in "-7" for **Q3.2b to Q3.2d**

4 If a section is skipped, for example in **SECTION 14,** the household does not use LPG for lighting, fill in **"0"** in the box for **Q14.1** and enter **"-7"** for the rest of the questions **(Q14.2 to Q14.11)** This means that the rest of the questions in **SECTION 14** do not apply to this household Thus, the whole section is not significant

CERTIFICATION

I certify on my honor that this interview was conducted by me honestly and completely and if found guilty of falsifying the interview, will be subject to forfeiture of allowances

______________________ Date of Interview

______________________ Signature Over Printed Name of Enumerator

______________________ Date Reviewed

______________________ Signature Over Printed Name of Supervisor

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 2. SOCIO-ECONOMIC INFORMATION

2 1 Information on the Respondent

2 1a Name of respondent Q2 1a

Last Name First Name M I

2 1b Sex of the respondent Q2 1b
Code [1] = Male [2]= Female

2 1c Age of the respondent (in years, whole number) Q2 1c

2 1d Educational level of the respondent Q2 1d

Code
[0] = Illiterate
[1] = Elementary level
[2] = Elementary graduate
[3] = High school level
[4] = High school graduate
[5] = Vocational
[6] = College level
[7] = College graduate
[8] = Post graduate education

2.1e Respondent's relation to household head Q2 1e

Code
[1] = Head
[2] = Spouse
[3] = Child
[4] = Parent
[5] = Brother or sister
[6] = Son or daughter-in-law
[7] = Others, specify ____________

2.2 Information on the Household Head

2 2a Sex of the household head Q2 2a
Code [1] = Male [2]= Female

2 2b Age of the household head (in years, whole number) Q2 2b

2 2c Age of the spouse of the household head (in years, whole number) Q2.2c

2 2d Occupation of the household head Q2.2d

Code
[1] = Gov't official/employee
[2] = Professional
[3] = Businessman/Trader
[4] = Private employee
[5] = Farmer/ Fishermen
[6] = Overseas worker
[7] = Laborer/ unskilled worker
[8] = Retired/Pensioner
[9] = Others, specify: ________

2 2e Educational level of the household head Q2.2e

Code
[0] = Illiterate
[1] = Elementary level
[2] = Elementary graduate
[3] = High school level
[4] = High school graduate
[5] = Vocational
[6] = College level
[7] = College graduate
[8] = Post graduate education

2.3 Information on Other Household Members

How many persons live in your household for most of the year (i.e., more than six (6) months in a year)

2 3a	6 years old and below	Q2 3a
2 3b	7-13 years old	Q2.3b
2 3c	14-17 years old	Q2.3c
2 3d	18-60 years old	Q2 3d
2 3e	61 years old and over	Q2.3e
2.3	**Total** (*sum of Q2.3a to Q2.3e*)	**Q2.3**

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 2 SOCIO-ECONOMIC INFORMATION, CONTINUED

2 4 What is the highest educational level attained among the immediate family members of the household? Q2 4

(Immediate family members could include children son/daughter in-law brother/sister of the household head, he/she may not currently be living at home i e studying in the city)

Code
[0] = Illiterate
[1] = Elementary level
[2] = Elementary graduate
[3] = High school level
[4] = High school graduate
[5] = Vocational
[6] = College level
[7] = College graduate
[8] = Post graduate education

2 5 How many persons in your household earn income? Q2 5

(Include all types of income earned by any household members who are working or take part in any activities that generate income for the household)

2.6 Information on Responding Household's Dwelling Unit

2 6a Type of ownership of the household's dwelling unit Q2 6a

Code
[1] = Owned
[2] = Renting
[3] = Using for free
[4] = Others, specify ________

2 6b Main type of construction material used for the household's dwelling unit Q2 6b

Code
[1] = Wood
[2] = Concrete
[3] = Bamboo/cogon
[4] = Others, specify _______

2.7 Business in the House

2 7a Is any part of your house used for business activity or commercial purposes? Q2 7a

Code [0] = NO, *go to SECTION 3* [1] = YES

2 7b If part of the house is used for business activity, please indicate type Q2.7b

Code
[1] = Hair salon or barbershop
[2] = Restaurant/Carinderia
[3] = Bakery
[4] = Sari-sari store
[5] = Furniture making/Carpentry shop
[6] = Handicraft making
[7] = Grain milling
[8] = Repair shop
[9] = Others, specify ________

If the responding household is engaged in more than one type of business, enter the one that generates the most income for the family

SECTION 3 INFORMATION ON FARM ASSETS

I will ask with you about the farm assets you have how much they cost and how did you acquire them

a) **How many of the following farm assets does your household have?**
Enter "0" for do not have any, "1" for one unit owned "2" for two units owned and etc ***If answer is "0", fill in "-7" for questions "b, c and d"' then go to the next asset***

b) **In what year did you acquire them?**
Enter 4 digits year such as 1994 1998 if the household has more than one unit enter the year of the most recently acquired unit

c) **How did you acquire (i.e., bought with credit or cash, or inherited, etc.) each asset in the past?**
If the household has more than one unit, ask for the mode of acquisition for the most recent acquisition

d) **How much (in pesos) did they cost?**
If the household has more than one, add up cost of all assets owned Enter "0" if no acquisition cost

For example, (a) a household has two (2) farm tractors, ***enter "2" in the box above Q3.2a,*** *(b) if one unit was bought in 1992 and another was bought in 1997,* ***enter "1997"in the box above Q3.2b.*** *(c) If the first unit was given or inherited but the second one was bought in full cash,* ***enter "1" in the box above Q3 2c*** *(d) If the first unit costs 2,000 pesos and the second one costs 3,500 pesos,* ***enter "5,500" in the box above Q3.2d***

	Farm Assets	**Number owned**	**Year acquired**	**Mode of acquisition** [1] = Full cash payment [2] = Installment [3] = Barter/in kind [4] = Given/inherited only [5] = Won from raffle/lottery [6] = Own construction [7] = Other, specify ________	**Acquisition cost (P) for all owned**
3 1	Building	Q3 1a	Q3 1b	Q3 1c	Q3 1d
3 2	Farm tractor	Q3 2a	Q3 2b	Q3 2c	Q3 2d
3 3	Seeder	Q3 3a	Q3 3b	Q3 3c	Q3 3d
3 4	Harvester	Q3 4a	Q3 4b	Q3 4c	Q3 4d
3 5	Thresher	Q3 5a	Q3 5b	Q3 5c	Q3 5d
3 6	Crop dryer	Q3 6a	Q3 6b	Q3 6c	Q3 6d
3 7	Grain mill	Q3 7a	Q3 7b	Q3 7c	Q3 7d
3 8	Water pump	Q3 8a	Q3 8b	Q3 8c	Q3 8d
3 9	Plow	Q3 9a	Q3 9b	Q3 9c	Q3 9d
3 10	Sprayer	Q3 10a	Q3 10b	Q3 10c	Q3 10d
3 11	Others specify ________	Q3 11a	Q3 11b	Q3 11c	Q3 11d

SECTION 4 INCOME AND EXPENDITURE FROM AGRICULTURAL ACTIVITIES

In this section, I am going to ask you about your farming activities including the type of crops planted quantity produced and sold during the past 12 months and the total revenue from sales

4 1 What is the total area of your farm in hectares? Q4 1 ☐
(*conversion 1 ha = 10,000 sq meters*)

4 2 For the land that you farm, does your family own or rent or use land for free or shared tenancy or is it mortgaged (nakasangla/prenda) to you? Q4 2 ☐

Code
[1] = Owner
[2] = Renting
[3] = Tenancy/shared tenancy
[4] = Using land for free
[5] = Land is mortgaged to the family (prenda/sangla)
[6] = Others, specify ____________

4 3 What is the main type of irrigation in your farm? Q4 3 ☐

Code
[1] = Rainfed
[2] = Open well
[3] = Stream, river, lake
[4] = Tubed/piped well
[5] = Gravity water/Irrigation
[6] = Others, specify ____________

Income by Type of Crops Planted for the Past Twelve Months

Interviewer asks for each of the crop that has been planted during the past 12 months and asks the following for each crop planted

a. **How many hectares of each of the following crops have you planted?**
Enter the total area (in hectares) planted for each crop The area of land used for the first and second rice crop may not be the same In this scenario, interviewer enters area (in hectares) of the higher rice production-crop For area less than one (1) hectare, use fraction

b. **How many cropping seasons/harvests did you have for each crop?**
Enter "2" if there were 2 cropping seasons/harvests for each crop during the past 12 months

c. **What is the average production (in kg) per cropping season?**
Enter the average production in kilogram If for example, the crop was planted twice or more during the past 12 months, get the average production by adding the production in each cropping and then dividing it by the number of cropping seasons If the crop was planted but failed with no production at all enter [0]

d. **What is the average quantity sold per cropping season (in kg)?**
Enter the average quantity sold for all cropping seasons/harvests (in kg) If the household has not sold any of the crop enter [0] *It should be noted that the questionnaire does not ask for the amount of crops that the household keep for own consumption or for planting next year Therefore, total production is not always equal to the quantity sold*

e **How much is the total sales for the past 12 months from each crop (in pesos)?**
Total sales last year refers to the total amount of money received from sale of the particular crop during the past 12 months If there are 2 cropping seasons, total sales will be equal to the peso value of crops sold in the first cropping season plus the peso value of the crops sold in the second cropping Peso value refers to the quantity sold multiplied by the price per unit

SECTION 4. INCOME AND EXPENDITURE FROM AGRICULTURAL ACTIVITIES, CONTINUED...

	Type of crops planted	Area planted (ha)	Number of cropping or harvest per year	Average prod'n. per cropping (kg)	Average quantity sold per cropping (kg)	Total sales (P)
4 4	Palay	Q4 4a	Q4 4b	Q4 4c	Q4 4d	Q4 4e
4 5	Corn	Q4 5a	Q4 5b	Q4 5c	Q4 5d	Q4 5e
4 6	Coconut	Q4 6a	Q4 6b	Q4 6c	Q4 6d	Q4 6e
4 7	Potato, tubers, root crops & bulbs	Q4 7a	Q4 7b	Q4 7c	Q4 7d	Q4 7e
4 8	Vegetables	Q4 8a	Q4 8b	Q4 8c	Q4 8d	Q4 8e
4 9	Fruit bearing trees/ banana	Q4 9a	Q4 9b	Q4 9c	Q4 9d	Q4 9e
4 10	(Enter name of crop) ____________	Q4 10a	Q4 10b	Q4 10c	Q4 10d	Q4 10e

4 11 How much did you earn (in pesos) from the sale of agricultural and forest by-products during the past 12 months? Q4 11 ☐

Agricultural by-products may include coconut shell, charcoal, coconut wine/vinegar, rice bran, etc Forest products include fuelwood, bamboo shoot, mushroom, etc collected from forestland

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Expenditure for Agricultural Activities for the Past 12 Months (All expenditure must be in pesos)

Interviewer enters the amount spent for each item for all crops discussed in Q4.4 to Q4.10 and Q4.11 Only include the amount of money spent (in pesos) either paid by cash or credit Do not include any payment in-kind

4.12 During the past 12 months, how much have you spent (in pesos) for each of the following items for your agricultural activities?

4 12a	Fertilizer	Q4 12a ☐
4 12b	Hired labor	Q4 12b ☐
4 12c	Chemical (i e herbicide and pesticide)	Q4 12c ☐
4 12d	Equipment & land rental	Q4 12d ☐
4 12e	Fuels for tractor or shredder	Q4 12e ☐
4 12f	Others, specify ____________	Q4 12f ☐
4.12	**Total** *(sum of Q4.12a to Q4.12f)*	**Q4.12** ☐

To the enumerator After the interview, please calculate the net cash income from agricultural activities

4 13	**Net Cash Income from Agricultural Activities (in pesos/year)**	**Q4.13** ☐

SECTION 5: INCOME AND EXPENDITURE FROM LIVESTOCK AND POULTRY PRODUCTION

In this section, I am going to ask you about livestock and poultry that your household previously raised, the number of livestock/poultry sold during the past 12 months, the price per head and the total revenue from sales

Income by Type of Animal Raised for the Past 12 months

For each type of animal listed below could you please tell me

a. **How many heads did you raise for the past 12 months?**
Enter [0] if did not raise any and fill in [-7] for Question b, c and d and go to the next type of animal

b. **During the past 12 months, how many heads has been sold?**
Enter number of heads sold. If household did not sell any enter [0] and fill in [-7] for questions c and d

c. **What is the average price per head?**
Enter price in pesos per head. If the household sold by kilogram ask for the average weight per head and calculate into number of heads. Divide total sales by the number of heads sold

d. **How much (in pesos) is the total revenue from sales?**
Total revenue refers to the total amount of money received from the sale of each particular type of animal during the past 12 months

	Type of animal	Number of heads raised	Quantity sold (heads)	Average price per head (P)	Total Sales (P)
5.1	Swine	Q5.1a	Q5.1b	Q5.1c	Q5.1d
5.2	Chicken	Q5.2a	Q5.2b	Q5.2c	Q5.2d
5.3	Cattle/Carabao/Horse	Q5.3a	Q5.3b	Q5.3c	Q5.3d
5.4	Goat	Q5.4a	Q5.4b	Q5.4c	Q5.4d
5.5	Ducks	Q5.5a	Q5.5b	Q5.5c	Q5.5d
5.6	Others, specify__________	Q5.6a	Q5.6b	Q5.6c	Q5.6d

5.7 How much did you earn (in pesos) from the sale of the above livestock by-products during the past 12 months? Q5.7 ☐
Livestock-by products may include eggs, milk, skin, feathers, chicken manure, etc

5.8 Cash Expenditure for Livestock & Poultry

Interviewer enters the amount that the household has spent in pesos for each item discussed in Q5.1 to Q5.6 and Q5.7. Only include the amount of money spent (in pesos) either paid by cash or credit. Do not include any payment in-kind

During the past 12 months, how much did you spend for each item for your livestock and poultry?

5.8a Feed 5.8a ☐

5.8b Hired labor 5.8b ☐

5.8c Veterinary supply and/or service 5.8c ☐

5.8d Stocks 5.8d ☐

5.8e Others, specify ____________________ 5.8e ☐

5.8 **Total** *(sum of Q5.8a to Q5.8e)* **Q5.8** ☐

To the enumerator *After the interview, please calculate the net cash income from livestock and poultry production*

5.9 **Net Cash Income from livestock and poultry (in pesos/year)** **Q5.9** ☐

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 6 INCOME AND EXPENDITURE FROM FISHING

In this section I will ask you about the type of fishing your household is engaged in amount sold per harvest and the total revenue from sales

6 1	During the past 12 months, did you and your family engage in fish production? Code [0] = NO, *go to SECTION 7* [1] = YES	Q6 1	
6 2	What type of fishing are you engaged in? Code [1] = Cage/Fish pond, ***go to 6 3*** [2] = Open sea fishing, ***go to 6.4*** [3] = Both, ***go to 6.3 and 6.4***	Q6 2	

6 3 Cage/Fish Pond ONLY

6 3a	On the average, how many times per year do you harvest fish?	Q6 3a	
6 3b	What is the average weight (in kg) per harvest?	Q6 3b	
6 3c	On the average, how much (in pesos) do you usually earn from the sale of fish per harvest?	Q6 3c	
6 3d	On the average, how much (in pesos) do you usually earn from the sale of fish per year?	Q6 3d	

6 4 Open Sea/Lake Fishing ONLY

6 4a	On the average, how many times per month do you catch fish?	Q6 4a	
6 4b	What is the average weight (in kg) per catch?	Q6 4b	
6 4c	On the average, how much (in pesos) do you usually earn from the sale of fish per catch?	Q6 4c	
6 4d	How many months in a year do you catch fish?	Q6 4d	
6 4e	On the average, how much (in pesos) do you usually earn from the sale of fish per year?	Q6 4e	

6 5 Cash Expenditure for Fishing

Interviewer asks for the total expenditures, either paid in cash or credit associated with fishing activities and production for the past 12 months Do not include any payment in-kind

6 5a	Fingerlings	Q6 5a	
6 5b	Feeds	Q6 5b	
6 5c	Hired labor	Q6 5c	
6 5d	Land /Boat rental	Q6 5d	
6 5e	Fuel and oil	Q6 5e	
6 5f	Others, specify ____________________	Q6 5f	
6 5	**Total (*sum of 6 5a to 6 5f*)**	**Q6.5**	

***To the enumerator** After the interview, please calculate the net cash income from fishing*

6.6	**Net Cash Income from fishing (in pesos/year)**	**Q6.6**	

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 7 HOUSEHOLD OTHER CASH INCOME AND EXPENDITURE

7.1 Other Cash Income

We have already talked about how much your household earns and spends on agricultural, livestock, and fishing activities. In the next questions, we would like to ask how much your household earns on other income sources and your expenditures on other household items that we haven't discussed

During the past 12 months, how much did the whole household earn from the following sources (in pesos)?

Enter "0" for no income from that activity

7.1a	Cash income from all sideline business	Q7.1a	
7.1b	Total wages/salaries of household members	Q7.1b	
7.1c	Government subsidy/remittance from relatives	Q7.1c	
7.1d	Income from gambling/lottery	Q7.1d	
7.1e	Other income, specify ______	Q7.1e	
	7.1 **Total** (*sum of 7.1a to 7.1e*)	**Q7.1**	

7.2 Household Expenditure

Interviewer asks for the total expenditures for household activities in the past 12 months
Do not include any in-kind payment

During the past 12 months, how much (in pesos) did your household spend for the following items?

7.2a	Household items (food, fuel, soap, etc.)	Q7.2a	
7.2b	Education	Q7.2b	
7.2c	Vices (cigarette, wine, gambling, etc.)	Q7.2c	
7.2d	Other expenditures such as house repair, medical, clothing, etc.	Q7.2d	
	7.2 **Total** (*sum of 7.2a to 7.2d*)	**Q7.2**	

To the enumerator: *After the interview, please add the net cash income from* ***Sections 3 to 5 and Q7.1*** *then subtract Q7.2 to get the net cash balance for the past 12 months*

7.3	**Net Cash Balance (in pesos/year)**	**Q7.3**	

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 8. HOUSEHOLD CREDIT: STANDING AND HISTORY

In this section, I will discuss with you about your credit experience in the past and the most recent loan taken by your household

8 1 Has your household ever obtained any loan? Q8.1 ☐

Code [0] = NO, *go to SECTION 9*
[1] = YES

8 2 What type of loan was taken?

Code [0] = NO
[1] = YES

8 2a	Cash	Q8 2a	☐
8 2b	Appliances/equipment	Q8 2b	☐
8 2c	Real property loan	Q8 2c	☐
8 2d	In kind	Q8 2d	☐
8 2e	Others, specify ________________	Q8 2e	☐

Note:
***The following questions are designed to gather information on credit history of respondent and apply to the most recent loan only** For example, respondent may have no outstanding loan i e, answer "0" in Q8 3 but the household may have borrowed money in 1990, so in Q8 4 enter 1990*

8 3 How many outstanding loans does your household have at present? Q8 3 ☐

8 4 When was the most recent loan taken? Q8 4 ☐
(*Enter year such as 1995, 1997, etc*)

8 5 What was the purpose of your loan? Q8 5 ☐

Code [1] = To buy food
[2] = Build/expand/repair house
[3] = Medical treatment/medicine
[4] = Business
[5] = Buy equipment/appliance (Indicate kind of appliance/equipment)_______________
[6] = For agricultural production
[7] = Family, social function, marriage, funeral
[8] = Others, specify ____________________

8 6 What was the source of your loan? Q8 6 ☐

Code· [1] = Bank
[2] = Cooperative
[3] = Merchant/seller/salesman for appliance/equipment
[4] = Relatives
[5] = Neighbors/private individual/local lender
[6] = Landlord
[7] = SSS, GSIS, PAG-IBIG
[8] = Others, specify ____________________

8 7 How much (in pesos) was the loan? Q8 7 ☐

SECTION 8. HOUSEHOLD CREDIT: STANDING AND HISTORY, CONTINUED

8.8 What is the maturity of the loan in months? Q8.8

(If maturity is beyond 5 years, enter 60; if no maturity enter 0; if less than one month, indicate fraction.)

8.9 What was the type of payment? Q8.9

This question refers to payment for either loan for cash or appliances or equipment purchased by installment/credit

Code [1] = Daily payment of principal plus interest *go to Q8.10*
[2] = Weekly payment of principal plus interest *go to Q8.10*
[3] = Monthly payment of principal plus interest *go to Q8.10*
[4] = Annually payment of principal plus interest, *go to Q8.10*
[5] = Pay back in full plus interest when loan is due, *go to Q8.11*
[6] = Payment of interest periodically and pay back principal in full when loan is due, *go to Q8.11*
[7] = Pay back with goods/farm products *go to Q8.11*
[8] = Others, specify _ _ _ _ _

8.10 How much was the amortization/payment (in pesos) for the period given in Q8.9? Q8.10

8.11 How much (in pesos) was the total interest payment? Q8.11
(If payment is in kind, convert to peso value.)

SECTION 9. SOURCES OF ELECTRICITY FOR LIGHTING AND OTHER ENERGY APPLICATIONS

In the next questions we would like to learn about the different types of fuels you use for lighting in the household Do you use any of the following as your source of electricity and lighting in your household?

Note to the interviewer: *Be sure to mention all fuel types since there is a need to capture the overall household electricity demand*

CODE [0] = NO
[1] = YES

9 1	Kerosene	Q9 1	☐
9 2	Dry cell battery	Q9 2	☐
9 3	Candles	Q9 3	☐
9 4	Charcoal (for ironing only)	Q9 4	☐
9 5	LPG	Q9 5	☐
9 6	Car battery	Q9 6	☐
9 7	Small scale power generator (electric gen-set)	Q9 7	☐
9 8	Solar PV system (electricity from the household-owned solar PV system)	Q9 8	☐
9 9	Micro-hydro system	Q9 9	☐
9 10	Electricity from the grid	Q9.10	☐
9 11	Others, specify ____________________	Q9 11	☐

To the enumerator:
Be sure to enter "-7" to all the boxes in all SKIPPED sections.

SECTION 10 KEROSENE

10 1 During the past 12 months how often did your household use kerosene for lighting? Q10 1 ☐

Code [0] = Do not use kerosene for lighting *go to SECTION 11*
[1] = Used sometimes/seldom (minsan/bihira)
[2] - Always (palagi/madalas)

10 2 On the average how many liters of kerosene does your household usually buy per purchase? Q10 2 ☐

10 3 What percentage of the kerosene bought per purchase is used for lighting? Q10 3 ☐

10 4 On the average, how much does your household spend on kerosene per purchase? Q10 4 ☐

10 5 On the average, how many total days does your typical purchase of kerosene last? Q10 5 ☐

10 6 On the average, how much does your household spend on kerosene per month? Q10 6 ☐

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10 7 How many simple wick kerosene lamps (gasera) does your household have? Q10 7 ☐

*(Enter '0" for none, and "-7" for Q10 7a, then go to **Q10.8**)*

10 7a On the average, how many hours per day does your household use simple wick lamp? Q10 7a ☐

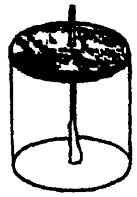
10 8 How many regulated wick lamps does your household have? Q10 8 ☐

*(Enter "0" for none, and "-7" for Q10 8a, then go to **Q10.9**)*

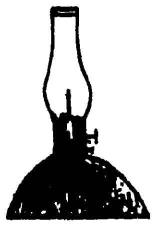
10 8a On the average, how many hours per day does your household use regulated wick lamp? Q10 8a ☐

10 9 How many pressurized kerosene lamps (hurricane lanterns, e g Coleman, Petromax, Butterfly) does your household have? Q10 9 ☐
(Enter "0" for none, and "-7" for Q10 9a)

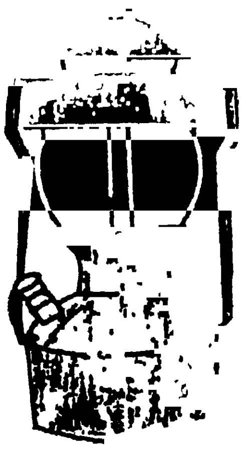
10 9a On the average, how many hours per day, does your household use pressurized lamps? Q10 9a ☐



Simple Wick Lamp



Regulated Wick Lamp



Pressurized Lamp (Petromax, Coleman

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 11 DRY CELL BATTERY

11 1 During the past 12 months did your household use dry cell battery for the following applications such as flashlight radio cassette etc? Q11 1 ☐

Code [0] = Do not use Dry Cell Battery *go to SECTION 12*
[1] = Used sometimes/seldom (minsan/bihira)
[2] = Always (palagi/madalas)

11 2 On the average, how many dry cell batteries does your household buy per purchase? *Enter number of dry cell batteries usually bought regardless of size* Q11 2 ☐

11 3 On the average how much does your household spend on dry cell batteries for each purchase? Q11 3 ☐

11 4 On the average, how many total days does your typical purchase of dry cell batteries last? Q11 4 ☐

11 5 On the average, how much does your household spend on dry cell batteries per month? Q11 5 ☐

Appliance Usage

a. **Do you use dry cell battery for each of these devices?**
Enter "0" if the household is not using dry cell battery, "1" if dry cell battery is being used for each item

b. **How many hours do you use this item per day?**
Indicate the total number of hours the device is used per day If the household owns more than one of this device, indicate the average number of hours used

c. **How many batteries do you use for each device?**
Again, if the household owns more than one of this device, indicate the average number of batteries needed to operate the device

	ITEM	**Do you use dry cell battery for each of these devices?** **[0] = No** **[1] = Yes**	**No. of hrs. used per day**	**No. of batteries used to operate the device**
11 6	Flashlight	☐ Q11 6a	☐ Q11 6b	☐ Q11 6c
11 7	Battery powered lamp	☐ Q11 7a	☐ Q11 7b	☐ Q11 7c
11 8	Radio and/or cassette	☐ Q11 8a	☐ Q11 8b	☐ Q11 8c
11 9	Other appliance, specify ____________	☐ Q11 9a	☐ Q11 9b	☐ Q11 9c

SECTION 12 CANDLE FOR LIGHTING

12 1	During the past 12 months how often did your household use candle for lighting? Code [0] = Do not use candle for lighting, *go to SECTION 13* [1] = Used sometimes/seldom (minsan/bihira) [2] = Always (palagi/madalas)	Q12 1	☐
12 2	How many candles does your household buy per purchase?	Q12 2	☐
12 3	On the average, how much does your household spend on candle for each purchase?	Q12 3	☐
12 4	How many total days does your typical purchase of candles last?	Q12 4	☐
12 5	On the average, how much does your household spend on candle per month?	Q12 5	☐

SECTION 13. CHARCOAL

13.1 During the past twelve months, how often does your household use charcoal for ironing? Q13.1 ☐

Code: [0] = Do not use charcoal for ironing, *go to SECTION 14*
[1] = Used sometimes/seldom (minsan/bihira)
[2] = Always (palagi/madalas)

13.2 How do you acquire your charcoal? Q13.2 ☐

Codes: [1] = Purchased, ***answer Q13.3a to Q13.3f and enter "-7" to Q13.4a to Q13.4b***
[2] = Own produce, ***answer Q13.4a to Q13.4b and enter "-7" to Q13.3a to Q13.3f***
[3] = Both produced and purchased, ***answer Q13.3a to Q13.4b***
[4] = Residue from used firewood, ***go to SECTION 14***

13.3 For Purchased Charcoal

13.3a	On the average, how many packs of charcoal do you usually buy per purchase?	Q13.3a	☐
13.3b	On the average, how much (in pesos) do you spend per purchase?	Q13.3b	☐
13.3c	On the average, how many days does each purchase last?	Q13.3c	☐
13.3d	What is the average weight in kilogram per pack?	Q13.3d	☐
13.3e	On the average, how much (in pesos) do you spend on charcoal per month?	Q13.3e	☐
13.3f	On the average, what percentage of charcoal is used for ironing each month?	Q13.3f	☐

13.4 For Own Produce

13.4a	How many kilograms of charcoal do you produce per month?	Q13.4a	☐
13.4b	What percentage of charcoal produced is used for ironing?	Q13.4b	☐

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 14 LIQUEFIED PETROLEUM GAS (LPG) FOR LIGHTING

14.1 During the past 12 months how often does your household use LPG for lighting? Q14.1 ☐

Code [0] = Do not use LPG for lighting *go to SECTION 15*
[1] = Used sometimes/seldom (minsan/bihira)
[2] = Always (palagi/madalas)

14.2 On the average, how many hours per day do you use your LPG for lighting? Q14.2 ☐

14.3 How many kilogram of LPG tank (i.e. LPG tank size) does your household usually buy each typical purchase? Q14.3 ☐

Code. [1] = 7 kg [3] = 50 kg
[2] = 11 kg [4] = Others, specify __________

14.4 How much does your household spend (in pesos) for the typical LPG purchase? Q14.4 ☐

14.5 How many days does each typical purchase last? Q14.5 ☐

14.6 On the average, how much (in pesos) does your household spend each month for LPG? Q14.6 ☐

14.7 In a typical month, what percentage of LPG is used for lighting? Q14.7 ☐

14.8 Where do you obtain your LPG? Q14.8 ☐

Code: [1] = Within the barangay
[2] = Town
[3] = Others, specify ______________

14.9 How far (in km) is the source specified in Q14.8? Q14.9 ☐

(If less than 1 kilometer, indicate the fraction)

14.10 What is the mode of transportation? Q14.10 ☐

Code [0] = None [3] = Jeepney/car
[1] = Tricycle/Motorcycle [4] = Animal/Animal driven
[2] = Motorboat [5] = Others, specify __________

14.11 How much (in pesos) transportation cost (round trip) is incurred when purchasing LPG? Q14.11 ☐

(Enter '0" for no transportation cost incurred.)

SECTION 15 STORAGE OR CAR BATTERY USED TO SUPPLY ELECTRICITY AT HOME

15 1 During the past 12 months did your household use car battery to supply electricity? Q15 1

Code
[0] = Do not use storage/car battery, *go to SECTION 16*
[1] = Used sometimes/seldom (minsan/bihira)
[2] = Always (palagi/madalas)

15 2 During the past 30 days, did your household use car battery to supply electricity? Q15 2

Code
[0] = No, did not use, *go to Q15 3*
[1] = Used as supplementary source of electricity, *go to Q15 4*
[2] = Used as the main source of electricity, *go to Q15 4*

15 3 What are your reasons for not using car battery during the past 30 days? Q15 3

Code
[1] = Out of order
[2] = Recharge is too costly
[3] = No transportation
[4] = Others, specify ____________________

15 4 How many storage (car) batteries does your household have? Q15 4

If the household has more than 2 car batteries, only ask for the most oftenly used 2 car batteries

Please refer to the Storage Battery Rating Table in the Enumerator's Manual

First Car Battery

15 5a What is the Voltage of your First car battery? Q15 5a

15 5b What is the Ampere-hour of your First car battery? Q15 5b

15 5c How much does the First car battery cost? Q15 5c

Second Car Battery

15 6a What is the Voltage of your Second car battery? Q15 6a

15 6b What is the Ampere-hour of your Second car battery? Q15 6b

15 6c How much does the Second car battery cost? Q15 6c

15 7 How many months did your previous battery last? Q15 7

(Enter 0 if you did not own any battery before)

15 8 On the average, how many hours per day does your household use electricity from storage/car battery (ies)? Q15 8

15 9 On the average, how many days per week does your household use electricity from storage/car battery (ies)? Q15 9

15 10 On the average, how many times in a month does your household recharge your battery? Q15 10

15 11 How many days does the battery give you services before the next recharge? Q15 11

SECTION 15 STORAGE OR CAR BATTERY, CONTINUED

15 12 On the average, how much do you spend on recharging all your batteries each month? Q15 12 ☐

15 13 On the average, how much does each recharge cost (*excluding transport cost*)? Q15 13 ☐

15 14 How far (in km) is the recharging station from your house? Q15 14 ☐

(If less than 1 kilometer, indicate fraction)

15 15 Which mode of transport does your household use to go to the recharge station? Q15 15 ☐

Code	[0] = None	[3] = Jeepney/car
	[1] = Tricycle/Motorcycle	[4] = Animal/Animal driven
	[2] = Motorboat	[5] = Others, specify ___________

15 16 What is the average round trip transportation cost (in pesos) to the recharging station? Q15 16 ☐

(Enter "0" for no transportation cost incurred)

15 17 What type of energy source does your battery charging station use? Q15 17 ☐

Code	[1] = Grid	[3] = Micro-hydro
	[2] = Solar	[4] = Diesel gen-set

15.18 In what type of appliance is your car battery used most of the time?
Code [0] = NO [1] = YES

15 18a	Black and white television	Q15 18a	☐
15 18b	Colored television	Q15 18b	☐
15 18c	Radio/cassette	Q15 18c	☐
15 18d	Karaoke	Q15 18d	☐
15 18e	Lighting appliance	Q15 18e	☐
15 18f	Others, specify ______________	Q15 18f	☐

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 16. GENERATOR SET

16 1	Does your household use electricity coming from a generator set?	Q16 1

Code [0] = Do not use, *go to SECTION 18*
[1] = Use electricity from village/community gen-set, *answer Q16.2 to Q16 8*
[2] = Use electricity from relative/neighbor gen-set, *answer Q16.2 to Q16 8*
[3] = Use electricity from family owned gen-set, *go to SECTION 17*
[4] = Others, specify____________________

Household Uses Electricity from Village/Community or Neighbor/Relative Owned Gen-set

16 2	How many months has your household been using electricity from village or neighbor owned gen-set?	Q16 2
16 3	On the average, how many hours per day does your household receive electricity services from the above source?	Q16 3
16 4	On the average, how many days per month does your household receive electricity services from the above source?	Q16 4
16 5	How many households including your household are sharing electricity from the same source?	Q16 5
16 6	How much (in pesos) does your household pay for electricity per billing period?	Q16 6
16 7	How many days does each bill cover?	Q16 7
16 8	How is your household charged for electricity bills?	Q16 8

Code [1] = Charged by number of light bulbs/tubes or appliances, *answer Q16 9a to Q16.9d*
[2] = Charged by agreed fixed monthly fee, *go to SECTION 18*
[3] = Other methods, please specify ____________________

Charged by Number of Load

16 9a	If household is charged/paid by number of light bulbs or tubes, how many light bulbs or tubes does your household have?	Q16 9a
16 9b	How much (in pesos) is the average charge per light bulb or tube?	Q16 9b
16 9c	If household is charged/paid by number of appliances, how many appliances does your household have?	Q16 9c
16 9d	How much (in pesos) is the average charge per appliance?	Q16 9d

Go to SECTION 18

SECTION 17. ELECTRICITY FROM FAMILY OWNED GEN-SET (answered "3" in Q16.1)

17.1 How many units of gen-set does your household have? Q17.1

17.2 How many months has your household been using your own electric gen-set to generate electricity for household uses? Q17.2

17.3 What is the rating in KVA of your gen-set? Q17.3

If household has more than one gen-set (e g , has spare gen-set) ask for the one that is used regularly or used the most

17.4 During the past 60 days, did your household use gen-set to supply electricity? Q17.4

Code: [0] = No, did not use, ***go to Q17.5***
[1] = Used as supplementary source of electricity, ***go to Q17.6***
[2] = Used as the main source of electricity, ***go to Q17.6***

17.5 What is your main reason for not using your gen-set during the past 60 days? Q17.5

Code: [1] = Out of order and repair is too costly
[2] = Out of order and no repair man/service available
[3] = Out of order and no parts available
[4] = Operating and maintenance cost is high
[5] = Others, specify ____________________

Acquisition Cost and Terms of Payment for Family Owned Gen-Set

If household has more than one gen-set (e g , has spare gen-set), ask for the one that is used regularly or used the most)

17.6 What was the condition of the gen-set you acquired? Q17.6

Code: [1] = Brand new
[2] = Used
[3] = Reconditioned/remanufactured one

17.7 How much (in pesos) did you spend in purchasing your gen-set? Q17.7

17.8 How many times does the household have to pay for the gen-set? Q17.8
If full payment was made when purchased, enter "1", and go to Q17.11

17.9 How much (in pesos) does your household have to pay per payment? Q17.9

17.10 How many months does each payment cover? Q17.10

17.11 What do you think about the price of your gen-set? Q17.11

Code: [1] = Very expensive [3] = Right price
[2] = Expensive [4] = Cheap

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 17. ELECTRICITY FROM FAMILY OWNED GEN-SET, CONTINUED

Operating Cost of the Gen-Set

17 12 On the average, how much did your household spend on fuels in a month for your own electric gen-set to generate electricity?

Q17 12

Fuel for gen-set can be used for many other applications such as, hand tractor, vehicle, and other machinery, therefore only ask respondent to give you the estimated amount of fuel that is used for gen-set to generate electricity only

17 13 What type of fuel does your household use for your gen-set?

Q17 13

Code [1] = Diesel [2]= Gasoline

17 14 In addition to fuel, on the average how much (in pesos) does your household spend on labor, oil, and maintenance per month to operate gen-set?

Q17 14

Interviewer asks for the average monthly costs for expenses including oil, maintenance costs, and labor If owner-operated, do not add labor cost in the total monthly costs

17 15 Typically, when gen-set is on, how many households does your own gen-set supply electricity to?
(Enter "0" if electricity generated from gen-set is used by your own household only)

Q17 15

Repairs of Gen-Set

17 16 How many times did your gen-set broke down since you bought it?

Q17 16

17 17 During the past 12 months, how much have you spent in repairing your gen-set?

Q17 17

17 18 During the past 12 months when the gen-set has broken down, which of the following parts have failed?

Q17 18

Code [1] = Dynamo [4] = Belt
[2] = Engine [5] = Others, specify ________________
[3] = Voltage regulator

17 19 Whenever the generator breaks down, how do you have it repaired?

Q17 19

Code [1] = Technician/repair person comes to our house to repair
[2] = Take it to the repair shop
[3] = Repair it by myself
[4] = Others, specify ____________________

17 20 What is the average cost (in pesos) of repair per visit? Or if you have repaired it by yourself how much did the repair/part cost?

Q17 20

17 21 How far is the repair shop from your house?

Q17 21

Enter '0' for repair it at home then go to SECTION 18

17 22 Which mode of transport does your household use to go to the repair shop?

Q17 22

Code [0] = None [3] = Jeepney/car
[1] = Tricycle/Motorcycle [4] = Animal/Animal driven
[2] = Motorboat [5] = Others, specify __________

17 23 How much (in pesos) is the total transportation cost (to and from) for each repair?

Q17 23

(Enter "0" for no transportation cost incurred)

SECTION 18 SOLAR PV SYSTEMS

18 1 During the past 12 months how often did your household use solar PV system? Q18 1 ☐

Code [0] = Do not use solar PV system, *go to SECTION 19*
[1] = Used sometimes/seldom (minsan/bihira)
[2] = Always (palagi/madalas)

18 2 What is the size (in Watt-peak, Wp) of the solar PV panel? Q18 2 ☐

18 3 What is the rating (in Amp-hour) of the battery used for PV system? Q18 3 ☐

18 4 On the average, how many hours per day do you usually use your PV system? Q18 4 ☐

18 5 On the average, how many days per week do you usually use your PV system? Q18 5 ☐

---

18 6 Did your PV system incur any repair in the past 12 months? Q18 6 ☐

Code [0] = NO, ***go to Q18.9*** [1] = YES

If yes, which part has broken down?
Code [0] = NO [1] = YES

18 7a Lamp Q18 7a ☐

18 7b Charge/Discharge controller Q18 7b ☐

18 7c Inverter Q18 7c ☐

18 7d Solar panel/module Q18.7d ☐

18 7e Ballast Q18 7e ☐

18 7f Others, specify ____________________ Q18 7f ☐

18 8 How much is the total cost (in pesos) of repair including materials and labor for the items enumerated above for the past 12 months? Q18 8 ☐

18 9 What year did you acquire your PV system (e g 1990)? Q18 9 ☐

18 10 How did you acquire it? Q18 10 ☐

Code· [1] Loan/Rent to own, ***answer Q18.11a to Q18.11e***
[2] Cash payment, ***go to Q18.12***
[3] Rented , ***go to Q18.13***
[4] Through project, ***go to SECTION 19***
[5] Others, specify ________________ ***go to SECTION 19***

If Acquired Through Loan:

18 11a What is the total cost (in pesos) of your system? Q18.11a ☐

18 11b Have you paid off your loan? Q18 11b ☐
Code· [0] = NO [1] = YES

18 11c How much (in pesos) is your initial down payment? Q18 11c ☐

18 11d How much (in pesos) is your monthly amortization? Q18.11d ☐

18 11e What is the maturity (in months) of your loan? Q18 11e ☐
(Enter "60" if more than 5 years) ***go to SECTION 19***

18 12 **If paid in cash,** what is the total cost (in pesos) of your system? Q18.12 ☐
go to SECTION 19

18.13 **If rented,** how much (in pesos) is the monthly rental? Q18.13 ☐

SECTION 19 MICRO-HYDRO SYSTEM (does not include battery charging station)

19 1 Does your household use electricity coming from micro-hydro? Q19 1

Code [0] = Do not use, *go to SECTION 20*
[1] = Use electricity from micro-hydro

19 2 In what year (e g 1990) was your household connected to the micro-hydro system? Q19 2

19 3 Who owns this micro-hydro system? Q19 3

Code [1] = Gov't/LGU [3] = Privately owned
[2] = NGO [4] = Coop

19 4 How much (in pesos) do you usually pay per billing period for your electricity consumption from the micro-hydro system? Q19 4

19 5 How many days does each billing period cover? Q19 5

19 6 How many kWh does your household use in each billing period? Q19 6
Enter "-7" if electricity is not charged by kWn consumed

19 7 How many hours per day are electricity services from micro-hydro system available for use? Q19 7

19 8 How many months per year does micro-hydro system provide electricity services? Q19 8

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 20. GRID SYSTEM

20 1 Does your household use electricity coming from the grid? Q20.1

Code: [0] = Do not use, *go to SECTION 21*
[1] = Use electricity from the grid

20 2 Please enter the full name of the utility/electric cooperative providing the services?
(*Example*, **Cebu Electric Cooperative II**)

Q20.2

20 3 How many months has your household been connected to the grid? Q20 3

20 4 How much did you pay (in pesos) for connection to the grid? Q20 4

20 5 On the average, how many hours per day does your household receive electricity services from the grid? Q20 5

20 6 On the average, how many days per month does your household receive electricity services from the grid? Q20 6

20 7 On the average, how much (in pesos) does your household pay for electricity per billing period? Q20 7

20 8 How many days does each billing period cover? Q20 8

20 9 How much (in pesos) is the charge per kWh? Q20 9

20 10 On the average, how much (in pesos) does your household pay for electricity in a month? Q20 10

SECTION 21. HOUSEHOLD ASSETS OWNERSHIP AND MODE OF ACQUISITION

a) **How many of the following appliances and/or vehicle does your household have?**
Enter "0" for do not have, "1" for one unit owned, "2" for two units owned and etc
If the responding household does not have that particular asset enter "0" in the "a" series questions, then "-7" for the following "b", "c", and "d" questions then go to the next asset

b) **In what year did you acquire them?**
Enter 4 digits year such as 1994, 1998 if the household has more than one unit, enter year for the most recently acquired unit

c) **How did you acquire (i.e., bought with credit or cash, or inherited, etc.) each asset in the past?**
If the household has more than one unit ask for the mode of acquisition for the most recent acquisition

d) **How much (in pesos) did they cost?**
If the household has more than one unit, add up cost of all appliances owned

For example, (a) a household has two (2) black and white TV enter "2" in the box above Q21.2a (b) if one unit was bought in 1992 and another was bought in 1997 enter "1997"in the box above Q21.2b (c) If the first one unit was given or inherited but the second one was bought in full cash, enter "1" in the box above Q21.2c. (d) If the first unit costs 2,000 pesos and the second one costs 3,500 pesos enter "5,500" in the box above Q21.2d

	Appliances	Number owned	Year acquired	**Mode of acquisition** [1] = Full cash payment [2] = Installment [3] = Barter/in kind [4] = Given/inherited only [5] = Won from raffle/lottery [6] = Own construction [7] = Other, specify	Acquisition cost (P)
21.1	Color TV	☐ Q21 1a	☐ Q21 1b	☐ Q21 1c	☐ Q21 1d
21.2	B & W TV	☐ Q21 2a	☐ Q21 2b	☐ Q21 2c	☐ Q21 2d
21.3	Radio/Cassette	☐ Q21 3a	☐ Q21 3b	☐ Q21 3c	☐ Q21 3d
21.4	Karaoke	☐ Q21 4a	☐ Q21 4b	☐ Q21 4c	☐ Q21 4d
21.5	VHS	☐ Q21 5a	☐ Q21 5b	☐ Q21 5c	☐ Q21 5d
21.6	Electric fan	☐ Q21 6a	☐ Q21 6b	☐ Q21 6c	☐ Q21 6d
21.7	Refrigerator	☐ Q21 7a	☐ Q21 7b	☐ Q21 7c	☐ Q21 7d
21.8	Pressurized lamp (petromax)	☐ Q21 8a	☐ Q21 8b	☐ Q21 8c	☐ Q21 8d
21.9	Water pump	☐ Q21 9a	☐ Q21 9b	☐ Q21 9c	☐ Q21 9d
21.10	Other appliance, specify ____________	☐ Q21 10a	☐ Q21a0b	☐ Q21a0c	☐ Q21a0d
	Vehicle				
21.11	Car or jeepney	☐ Q21 11a	☐ Q21 11b	☐ Q21 11c	☐ Q21 11d
21.12	Motorcycle/tricycle	☐ Q21 12a	☐ Q21 12b	☐ Q21 12c	☐ Q21 12d
21.13	Motorboat	☐ Q21 13a	☐ Q21 13b	☐ Q21 13c	☐ Q21 13d
21.14	Other vehicle, specify ____________	☐ Q21 14a	☐ Q21 14b	☐ Q21 14c	☐ Q21 14d

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 22. APPLIANCE AND LIGHTING FIXTURES USAGE

a. **What type of appliances and electric lamps do you have?**
Be sure that the interviewer asks and lists down all the electric appliances and lighting fixtures being used by the household If two electric lamps/appliances of the same type have different wattage, they should be listed separately

b. **What is the wattage of appliance/electric lamp?**
The interviewer does not need to ask the respondent on the wattage of the electric lamp, he/she should look at this device himself For electric appliances, the interviewer shall be provided with the list of all possible appliances in the household, their size (e g , inches, cu m , etc) and the corresponding wattage of each appliance

c. **Per type of electric lamp/appliance, how many units do you have?**
Indicate only the appliance/electric lamp that is currently being used or operational

d. **On the average, how many hours per day are you using this electric lamp/appliance?**
The enumerator should get the average number of hours of usage for each type of appliances For example, if there are 2 fluorescent bulbs with the same wattage and one bulb is used for 3 hours while the other is used for 5 hours, the average number of hours used per day is 4 hours

Whenever possible and practical, please check on the rating plate of the appliances Check only those appliances that are actually being used

Type of Bulb/Appliance

[1] = Incandescent
[2] = Fluorescent
[3] = Energy saving lamp
[4] =B&W TV
[5] = Color TV
[6] = Radio/Cassette
[7] = VHS
[8] = Karaoke
[9] = Others, ________________

Type of Bulb/Appliance	Capacity/Wattage	Number of Bulbs/Appliances	Average number of hours used per day
Q22 1a	Q22 1b	Q22 1c	Q22.1d
Q22 2a	Q22 2b	Q22 2c	Q22.2d
Q22 3a	Q22 3b	Q22 3c	Q22.3d
Q22 4a	Q22 4b	Q22 4c	Q22 4d
Q22 5a	Q22 5b	Q22 5c	Q22.5d
Q22 6a	Q22 6b	Q22 6c	Q22.6d
Q22.7a	Q22 7b	Q22 7c	Q22.7d
Q22.8a	Q22.8b	Q22.8c	Q22.8d

To the enumerator:
Please compute for the total monthly expenses of the household for lighting fuels from Section 10 to Section 19. This will be used in SECTION 26.

Total Monthly Lighting Fuel Cost (in pesos) ☐

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 23. HOUSEHOLD ACTIVITIES

I will read some common household activities. I would like to know how frequent your household does the following activities

Code [0] = Never (means not doing the listed activities)

[1] = Sometimes (means doing the listed activities occasionally)

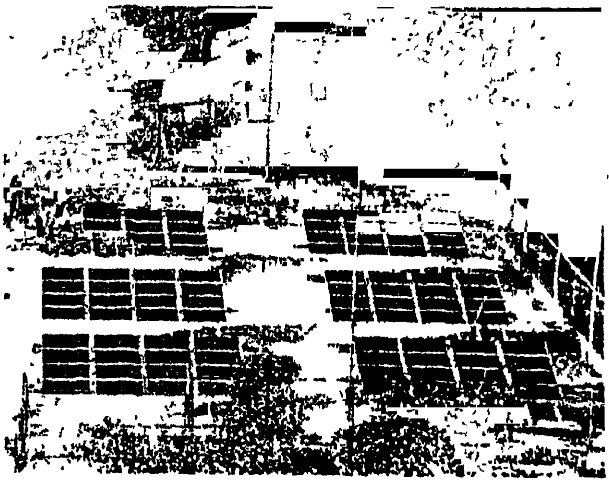
[2] = Always (means doing the listed activities most of the time)

The following questions refer to any form of electric lighting as well as non-electric lighting

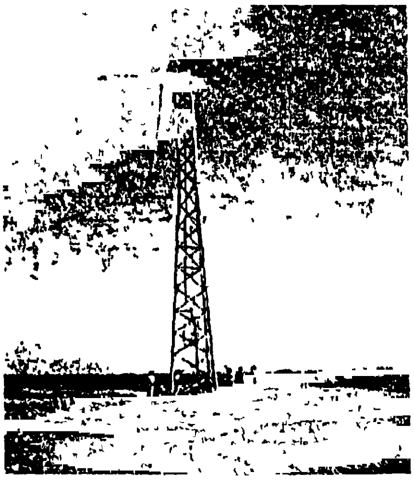
23 1 Does the household leave lighting on throughout the night for security purposes? Q23 1 ☐

23 2 Does the household leave lighting on throughout the entire evening for livestock/crops? Q23 2 ☐

23.3 Do your children study at night? Q23 3 ☐



Solar PV System



Wind System

Micro-hydro System

Biomass System

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 24. LEVEL OF KNOWLEDGE ON NRE

I am going to discuss and explain the following New and Renewable Energy (NRE) systems that can provide electricity for the whole community

- **Solar PV system** uses the power of the sun to generate electricity
- **Wind system** uses wind to produce electricity
- **Micro-hydro** taps the running water from rivers and streams to produce electricity
- **Biomass** uses agricultural residues such as ricehull, coconut residues, bagasse, animal wastes to produce electricity

Now that you know how these NRE systems operate to provide electricity, I am going to ask you if you have heard them before this interview and where have you heard them

Code [0] = NO
[1] = YES, from newspaper or magazine
[2] = YES, from radio or TV
[3] = YES, from neighbors, friends and relatives
[4] = YES, from ANEC
[5] = YES, from school
[6] = YES, from other source, specify ______________

24 1a	**Solar PV system**	Q24 1a	☐
24 1b	**Wind system**	Q24 1b	☐
24 1c	**Micro-hydro**	Q24 1c	☐
24 1d	**Biomass**	Q24 1d	☐

Preference for NRE

24.2 After knowing each NRE potential source, which of the following systems would you prefer if your household were to be given electricity? Q24.2 ☐

Code. [0] = No preference
[1] = Solar PV system
[2] = Wind system
[3] = Micro-hydro
[4] = Biomass
[5] = Others, specify ________________

SECTION 25. HOUSEHOLD ATTITUDE/PERCEPTION

I am going to read to you the following statements concerning present energy use and other issues. Please tell me if you agree or disagree with these statements. ***Use the following codes for answer***

Code [1] = Agree [2] = Disagree [3] = No opinion/don't know

25.1	Having electricity in a household is important for children's education	Q25.1	☐
25.2	Because of good light, children would study more at night	Q25.2	☐
25.3	In my house, it is easy to read in the evening	Q25.3	☐
25.4	Reading is easier with electric lamps compared to kerosene lamps	Q25.4	☐
25.5	Presently, it is difficult for my family to get news and information	Q25.5	☐
25.6	My family is extremely happy with the light we get from our current fuel	Q25.6	☐
25.7	Lighting with kerosene or diesel can cause health problems	Q25.7	☐
25.8	Car batteries are good source of electricity for lighting	Q25.8	☐
25.9	Solar PV is a good source of electricity for lighting	Q25.9	☐
25.10	Electricity is very beneficial to livelihood activities	Q25.10	☐
25.11	Electricity is important to our water supply	Q25.11	☐
25.12	We often socialize with friends, relatives or neighbors in the evening	Q25.12	☐
25.13	Compared to 10 years ago, life is better today	Q25.13	☐
25.14	I would rather wait for electricity from the grid than investing in electric gen-set	Q25.14	☐
25.15	I would rather wait for electricity from the grid than investing in NRE system	Q25.15	☐
25.16	Buying electric gen-set is one of my family's investment priorities	Q25.16	☐
25.17	Buying solar PV home system is one of my family's investment priorities	Q25.17	☐
25.18	Monthly electric bill is/would be a financial burden for my family	Q25.18	☐
25.19	Monthly spending for lighting fuel would be/is/was a financial burden for my family	Q25.19	☐
25.20	If someone/government/NGO were willing to lend me money to buy solar PV system, I would seriously consider it	Q25.20	☐
25.21	If solar PV were to become available widely in the market, I would seriously consider buying it even if I have to borrow money from someone	Q25.21	☐
25.22	If grid electricity were to become available, I would seriously consider connecting to the grid even if I have to borrow money from someone to pay for the connection	Q25.22	☐

SECTION 25 HOUSEHOLD ATTITUDE/PERCEPTION, CONTINUED..

The following questions apply only to households with access to electricity such as gen-set, solar PV, micro-hydro, car batteries and grid. Otherwise put "-7" to these questions and proceed to the next section

25.23	Please tell me whether electricity supply which you are using now is	Q25.23	☐

Code [1] = Not enough for household need (kulang/hindi sapat)
[2] = Just enough for household need (tama lang/sapat lang)
[3] = More than enough for household need (sobra)

25.24 The following is the list of possible reasons for households to obtain electricity. Please tell me the reason why your household decided to obtain electricity.

Code [1] = Extremely important/extremely beneficial (napakahalaga)
[2] = Important/beneficial (mahalaga)
[3] = Not important/not beneficial (hindi mahalaga)

25.24a	The reason why my household decided to obtain electricity is For children's education	Q25.24a	☐
25.24b	The reason why my household decided to obtain electricity is For better lighting	Q25.24b	☐
25.24c	The reason why my household decided to obtain electricity is To watch television	Q25.24c	☐
25.24d	The electricity we are using is cheaper than kerosene and other fuels	Q25.24d	☐
25.24e	The greatest benefit of electricity to my family is Accessing to news and information from TV and radio	Q25.24e	☐
25.24f	The greatest benefit of electricity to my family is Providing lighting for my family	Q25.24f	☐

SECTION 26. PREFERENCE, ABILITY AND WILLINGNESS TO PAY FOR ELECTRICITY

If electricity were to become available....

26 1 What time of the day do you think electricity is most needed? Q26 1 ☐

Code [1] = Whole day (24 hours) [3] = From 6pm to 6 am
[2] = From 6 p m until 10 p m [4] = Others, specify ___________

26 2 What type of payment would you prefer? Q26 2 ☐

Code [1] = Weekly [4] = Quarterly
[2] = Monthly [5] = Others, specify ________________
[3] = Bi-monthly

26 3 What form of payment do you want? Q26 3 ☐

Code [1] = Cash [3] = Others, specify ________________
[2] = In kind

26 4 According to what you have told me, your household currently spends about P_____ per month for lighting *(add up all expenditure for lighting fuel from Section 10 to Section 19, if applicable)* to provide energy to your household If electricity were available in your area, how much are you willing to pay? Q26 4 ☐

Code [1] = Same as what you are spending for fuels
[2] = More than what you are spending for fuel, ***go to Q26.5***
[3] = Lower than what you are currently spending for fuels, ***go to Q26.6***

26 5 You said your are willing to pay more than P________, please tell me exactly how much you are willing to pay per month? Q22 5 ☐

26 6 You said you are willing to pay lower than P________, please tell me exactly how much you are willing to pay per month? Q22 6 ☐

26 7 What mechanism of payment would you think is the most convenient? Q26 7 ☐

Code [1] = Through banks [4] = Through pre-paid-electronic cards
[2] = With a collector [5] = Others, specify ___________
[3] = Pay to utility providing service

Do you have plans of purchasing any of the following electric appliances?
Code [0]= NO [1] = YES

26 8a	Radio and/or cassette	Q26 8a	☐
26 8b	Black and White TV	Q26 8b	☐
26 8c	Colored TV	Q26 8c	☐
26 8d	Washing machine	Q26 8d	☐
26 8e	Electric fan	Q26 8e	☐
26 8f	Refrigerator	Q26 8f	☐
26 8g	Electric flat iron	Q26 8g	☐
26 8h	Electric machinery or tools	Q26 8h	☐
26 8i	Others, specify ___________	Q26 8i	☐

Refer to the following codes: [-7] = Does not apply [-8] = Do not know

SECTION 27. HOUSEHOLD'S DESIRE FOR SERVICES

Which of the following services would you like to have first, second, third, etc?
(Enter the rank numbers (1, 2 or 3) you like to have first, second, third and so on)

27.1	Clean potable water **(Malinis na tubig inumin)**	Q27.1	☐
27.2	Electricity **(Kuryente)**	Q27.2	☐
27.3	Educational facilities **(paaralan/iskwelahan, guro, atbp.)**	Q27.3	☐
27.4	Irrigation **(Patubig sa mga pananim)**	Q27.4	☐
27.5	Roads, bridges and other infrastructure **(Kalsada, tulay atbp. imprastraktura)**	Q27.5	☐
27.6	Public transportation **(Pampasaherong sasakyan)**	Q27.6	☐
27.7	Health facilities **(Klinika/center, doktor, nurse, atbp.)**	Q27.7	☐
27.8	Job opportunities **(Pangkabuhayan/trabaho)**	Q27.8	☐
27.9	**Others, specify** ____________________	Q27.9	☐

Refer to the following codes [-7] = Does not apply [-8] = Do not know

Source. Environment & Economics in Project Preparation Ten Asian Cases
By. P Abeygunavardane, Bindu N Lohani, Danielle W Bromley, Ricardo Carlos, V Verva. 2000

Table . Environmental Impacts of Various Projects and Possible Valuation Methods

Type of Project	Project Component and Environmental Impact	Measurement and Valuation Methods (comments)
Natural Resource and Agricultural Development		
Upland watershed management	Increases fuelwood and fodder production, and protects critical watershed resulting in higher quality and quantity of water Reduces soil erosion and landslides and improves agricultural production and water supply, improved water supply can be used for hydropower generation, irrigation, and drinking purposes	• Change in productivity of forests and agricultural land • Change in productivity of irrigated agriculture downstream • Opportunity cost of dung as fertilizer or value of benefit from alternative fuel • Increased timber value • Increased hydropower production due to better regulation and increased flow • Willingness to pay for drinking water • Biodiversity values and other global benefits
Integrated coastal resources management	Controls overexploitation of shrimp and other coastal fishery resources; provides alternative income generation, rural credit, and assists women in development Provides fisher education, institution building, and environmental monitoring/ surveillance; controls coast erosion Provides coastal and sea pollution control including solid and wastewater management	• Change in fisheries and coast-based productivity with and without project • Loss of earnings of artisanal fishers must be subtracted from project-catch projections • Benefits from coastal erosion control, land value and other property value enhancement, and hedonic pricing • Beach development, increased tourism revenue • Enhanced recreation values can be accounted either through (i) travel cost method (TCM), (ii) willingness-to-pay (WTP) or hedonic pricing

Type of Project	Project Component and Environmental Impact	Measurement and Valuation Methods (comments)
Natural Resource and Agricultural Development *(cont'd)*		
	Mangrove and lagoon rehabilitation improves coastal environment, special area management improves biodiversity and tourism Moving from coastal to offshore fishing enhances sustainability	• Pollution control benefits accounted for through WTP, cost of illness, or loss of productivity • Biodiversity values and other global benefits
Livestock development	Reduces overgrazing in forests and rangeland Reduces soil erosion Provides rural credit and development of women Improves employment, nutrition, and draft power and increases production of hide, dung, bone, etc Increases agricultural production due to integrated farming	• Change in productivity of forests and rangeland • Increased income and employment • Increased productivity due to improved human health, nutrition, and quality of life • Opportunity cost of dung as fertilizer or domestic fuel • Increased productivity of croplands •
Drainage and irrigation management	Reduces waterlogging and soil salinization/acidity problems Controls mosquito-caused and other waterborne diseases Watershed development component can be introduced Increases inland fisheries	• Change in productivity from better growing conditions for agricultural crops • Cost-effectiveness of alternative rehabilitation designs • Health impacts can be measured through loss of earnings, cost of illness, or preventive expenditures

Type of Project	Project Component and Environmental Impact	Measurement and Valuation Methods (comments)
Natural Resource and Agricultural Development *(cont'd)*		
	Increases employment, development of women, incomes, rural credit, and institution building	• Improved water supply and increased forest products from watershed improvement • Increased fish productivity • Increased income and productivity
Infrastructure Development		
Integrated rural development in hilly areas	Improves social (credit, clean water, community services, market access) and physical (schools, hospitals, rural roads) infrastructure Avoids property loss from soil erosion and landslides Increases agricultural productivity	• Changes in productivity, increased incomes, time savings, and increase in quality of produce • Change in productivity due to soil erosion and sedimentation • Hedonic pricing
Urban housing	Better living conditions and improved well-being Increases air pollution due to use of heating systems Indoor pollution due to burning coal briquettes, fuelwood, and other cooking fuels Environmental nuisances such as dust, noise during construction Problems with solid waste and wastewater disposal	• Increased productivity and time savings from improved living standards • Cost-effectiveness of alternative heating designs • Loss of earnings from increased respiratory diseases • Cost of illness or cost of medication due to change in housing arrangement

Type of Project	Project Component and Environmental Impact	Measurement and Valuation Methods (comments)
Infrastructure Development *(cont'd.)*		
	Housing schemes can be connected to (i) district heating systems, (ii) community/municipal sewage and solid waste disposal systems, and (iii) other public utilities	
Water		
Urban water supply and wastewater management	Increases wastewater volume without adequate sewerage facilities Reduces water for down-stream users Large water storage may damage the environment Include wastewater treatment facilities as a part of the project Industry rellocation can also be included During construction of supply lines or sewerage systems, disturbances can occur Improves heath status and reduces waterborne diseases, improves surface water quality which increases property values, aquatic production, and recreation values	• Avoided loss of earnings directly due to flooding • Change in incidence of waterborne diseases via WTP or health cost • Change in productivity of downstream water users • WTP for improved health due to better water supply and wastewater treatment • Change in property value due to water storage and cleaner surface water via land rent method or opportunity cost • Increased aquatic productivity • Enhanced recreation values can be accounted either through (i) TCM, (ii) WTP, or (iii) hedonic pricing
Rural water supply	Watershed development in upstream areas can be a part of the project.; increases water supply	• WTP for improved health or avoided health cost and avoided loss of productivity due to better drinking water

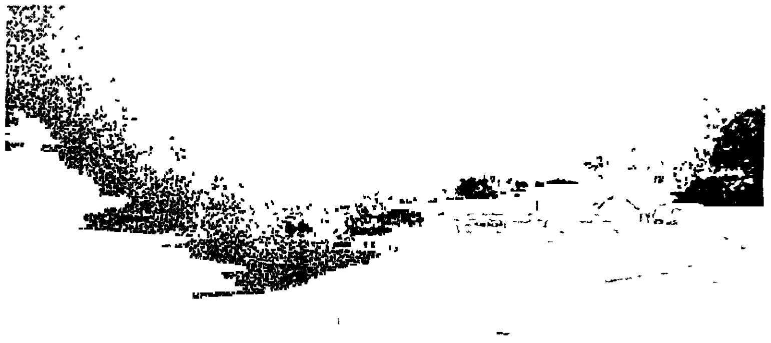
Type of Project	Project Component and Environmental Impact	Measurement and Valuation Methods (comments)
Water *(cont'd)*		
	Relies on community organization and creates time savings particularly for women fetching water	• Willingness to pay for time, cost savings from water fetching and opportunity cost of alternative earnings during water fetching
Industry and Energy		
Hydropower development	Service roads promote deforestation resulting in changes in hydrological patterns, soil erosion, siltation, and flooding Reservoir inundation causes loss of land, environmental damage, loss of biodiversity and disturbs fish movements Electricity distribution lines may disturb the aesthetic values in the vicinity Electromagnetic fields Avoided environmental emissions could be due to alternative energy sources such as coal, lignite, or fossil fuel May result in relocation and resettlement of indigenous people and reduce agricultural land Downstream water users may be affected by regulated water flow	• Change in productivity of forests, agricultural land and downstream fishery, competition with downstream hydropower and other water use activities • Loss of earnings as a direct result of inundation • Loss of biodiversity due to inundation and in aquatic environments due to dam construction • Cost of adverse environmental impacts in construction such as dust, noise, water safety • Increased incidence of waterborne diseases through cost of illness • Cost avoided or opportunity cost of human health and welfare damages due to emissions caused by alternative energy sources (e g , coal) • Loss of earnings or cost of resettlement and relocation • Loss of electricity production due to dismantling and closure of old and inefficient coal or fossil-fuel power plants is a cost, but emissions reduction is a benefit

Type of Project	Project Component and Environmental Impact	Measurement and Valuation Methods (comments)
Industry and Energy *(cont'd.)*		
Coal-fired thermal power plant	Air pollution (TSP, CO_2, NO_x, SO_2, and other emissions) Project components may be land acquisition, resettlement, provision of transmission lines, closure of old and inefficient power plants, institutional strengthening and capacity building, and introduction of clean coal technologies	• Loss of productivity and cost of illness due to air pollution • Visibility reduction and reduction in water quality through WTP • Noise, visibility pollution through change in property values • Loss of fish production and other aquatic resources • Loss of electricity production due to dismantling and closure of old and inefficient coal or fossil-fuel power plants is a cost, but emissions reduction is a benefit
Industry restructuring project	Improves energy efficiency Reduces air/water/land pollution (e.g. reduces SO_2, TSP and other industrial wastes such as smoke, dust, heavy metals, wastewater, etc.) Reduces waste through cleaner production processes Improves workers' health and safety and provides new employment Introduces better technologies, change in products and processes, relocation, privatization, and reorientation	• Increased efficiency can be measured via reductions in cost, raw materials and energy savings • Hedonic pricing for quality differences in goods and services produced • WTP for reduced air and water pollution • Benefits of health improvement can be measured through reduced cost of illness or increased productivity • Hedonic pricing for workers' health and safety • Benefits from recycling of waste materials

APPENDIX

Ramakrishna Mission Initiative Impact Study

Draft technical report



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April 2000

TERI Report No 99RE42

Executive Summary

This report has been prepared by TERI for National Renewable Energy Laboratory, US under its contract no. DE-AC36-99G010337. It presents the results of the evaluation and impact assessment of solar photovoltaic lighting systems in the region of Sunderbans, West Bengal, that were deployed by a reputed NGO Rama Krishna Mission under the auspices of INDO-US collaborative project.

The objective of the study were to evaluate the SPV systems for their impact on the individual households as well as on the community, assess the effectiveness of the implementation and financial mechanisms, and to draw a long-term strategy for NREL's activities in Sunderbans based on case studies of similar interventions.

Description of the project

Sunderbans, a part of the vast delta of River Ganga, is characterized by mangrove swamps and islands interwoven by a network of small rivers, waterways, creeks, and tracts. Due to these this geographical features of the region, it is very difficult to extend the grid network to supply power to its population, which traditionally has been depending on kerosene and diesel generating sets for its electricity requirements. With the intervention of the central and state governments, and through the efforts of NGOs such as the Rama Krishna Mission, the island community now has access to electrical power through the use of renewable energy systems. Solar home lighting systems based on photovoltaic technology are deployed in large numbers in individual households for providing power to a couple of light points and a TV set.

In 1996, NREL had planned to implement a project in a selected block (Gosaba) of Sunderbans in collaboration with the Indian Ministry of Non-conventional Energy Sources on an equal fund-sharing basis. Under the project, provision was made to supply 300 DLS (domestic lighting systems) based on 53 Wp module capacity to individual households and a few other systems such as for lighting, medical refrigeration, and pumping water to community centres. Rama Krishna Mission was identified to be the implementing agency and TERI (Tata Energy Research Institute) was given the contract for pre- and post-installation studies. Rama Krishna Mission deployed 290 DLS and all the community centre systems. Remaining 10 DLS were deployed by the WBREDA (West Bengal Renewable Energy Development Agency).

TERI evaluated the systems in 1997 and reported its findings to NREL. However, at the time of the evaluation, the systems at the community centres had not been installed and the DLS had been installed by the households only recently; therefore, the systems had not been operational long enough for proper evaluation. Consequently, it was decided that a complete evaluation and impact study be undertaken in 1999, which should not only survey the households that had been surveyed before (*repeat survey*) and study the effectiveness of community centres systems but also draw a long-term strategy for NREL's future activities based on case studies of similar interventions. The present report is a report of that study

Performance evaluation and impact assessment of SPV domestic lighting systems

Totally, 152 households were surveyed, out of which 29 had also been a part of the earlier pre-and post-installation surveys, 47 had been a part of the earlier post-installation survey, and 76 were new households which were surveyed for the first time. A set of 46 out of the total 152 households was selected for evaluating the systems for their technical performance with respect to module output, condition of the battery, and daily energy consumption.

Of the total 300 modules, 2 had been stolen; 9 out of the total 300 batteries needed to be replaced, and 10 out of the 300 charge controllers were non-functional. The statistics for the surveyed households indicate 32 luminaire-related faults (blackening or flickering of CFL's) and 11 other faults related to fuse, switches, etc.

The households have found the DLS useful in several ways: the light makes it possible for children to study even after daylight hours, it deters thieves, and the family can watch TV. There is a demand for additional light points or a higher capacity system by 73% of the surveyed households. Due to the increase in family size, 56% households want to purchase additional systems. One of the most significant advantages of DLS, as reported by 93% households, is security against thefts.

Consumption of kerosene, which was the only source of lighting in the households prior to DLS, has been reduced by 7 litres per month on an average. Since the households are now able to meet 50% or more of their demand from the kerosene bought from the Public Distribution System at Rs 3.50 a litre, there is a substantial saving in monetary terms as well. (From Rs 72.3 to 32.64 per month on an average in one of the villages)

Most of the batteries were found to be in good physical condition with respect to casing, battery terminals, and battery boxes. The average daily ampere–hrs received by the batteries is in the range 10–15, whereas the consumption is about 10 ampere–hrs daily. Illumination was inadequate for reading in a few households.

Each DLS customer was expected to pay about 50% of the total cost of the system through a financing scheme (Rs 3500 as a down-payment and Rs 3600 to be paid 60 equal monthly instalments). Payment collection has been 88% till date

Evaluation of SPV system installed at the community centres

In order to provide benefits to the community at large, and particularly to those who do not have access to DLS, different types of SPV systems were provided to the village youth clubs. These youth clubs are involved in community development through such activities as running libraries, organizing social and cultural festivals, and offering tuition to children of the poor. Depending on the focus, the clubs were given appropriate systems to suit specific objectives, a medical refrigerator and lighting system to health centre, and lighting systems to the weaving-cum-training centres to increase their hours of operation, battery charging stations to provide a better alternative for charging batteries, and a water pump to youth club.

Eight institutions received SPV systems: five youth clubs, two weaving-cum-training centres, and one health centre. The most significant impact of the lighting systems provided to the youth clubs has been on the education of children from the poorer families because members of the youth club provide tuitions to these children at a nominal fee in the evening within the club premises.

In general, the systems have not been used fully on account of the slow development of the institution itself. For example, the health centre frequently faces a situation when the doctor is not present for months together and the SPV lighting system, although functional, is still not able to serve the community.

Of the two battery charging stations, one has been able to sustain its popularity, while the other faces a tough competition from the diesel set charging shops which provide a facility of complete battery service to the customer. With the growing popularity of the gasifier plant in Gosaba, battery charging is fast becoming a household activity where consumers use electricity from the gasifier to install a charger at home and extend this service to their neighbours as well. Rupayan solar battery charging station is the least preferred option in Gosaba.

Study of other initiatives in the region

Several other interventions in the region were studied to get strategic inputs for developing a long-term plan for NREL in the region. The biomas gasifier power plant at Gosaba, a 25-kWp SPV power plant, a private solar shop, Aditya solar shop (run by the Ministry), a comprehensive health project, and battery charging shops using diesel generators were studied for this purpose.

It was observed that while there is a sizable number of households that still need DLS, there is also a growing demand for AC mains electricity, which is being supplied by the gasifier plant and by the 25-kWp SPV plant. There is also a need for an alternative to the diesel generator which currently supplies electricity to shops in the weekly market. Owners of these shops prefer to pay Rs 4-5 a day to the supplier for getting electricity to power a 100 watt bulb for 4-5 hours, rather than invest in thousands of rupees to purchase any type of SPV system.

The case study of the diesel generator charging shops highlighted the preference of customers for these shops because it is a one-stop-shop for all battery-related services. These shops enjoy credibility among the villagers who not only buy batteries or get them serviced but also resell the batteries to these shops.

Long-term strategy

Based on the evaluation of the DLS, the community centre systems, and other interventions in the region, a future plan of activities for NREL has been drawn up focussing on four major issues, which are described below.

1 Improved utilization of available hardware inclusive of DLS, water-pumping system, battery charging stations, and systems at community centres.

It has been shown that within the existing capacity of the DLS, it is possible to provide one more light point, thereby satisfying the additional needs of the households. Further, to continue with the community development work that these centre have been committed to, it is proposed to provide ten more lighting systems through Rupayan with a condition that the existing recipient centres utilize their SPV systems fully and are able to show the same both in quantity and quality. The scheme may be implemented through a business plan with appropriate monitoring indicators and a milestones chart.

As for the battery charging stations, it is suggested that the one at Rupayan be dismantled and its hardware rehabilitated in the form of DLS. Eighty new customers can be given DLS through this activity.

After 24–28 months of rehabilitating the Rupayan station, Chotomollakhali can be rehabilitated in a similar way only if it fails to sustain itself during the period

2 *Utilization of existing funds for future expansion of the DLS programme*

The project till now has generated approximately Rs 1.26 million rupees by way of a revolving fund through initial down-payment and the monthly instalments from 290 DLS customers, out of which a small amount has been spent on project management. These funds are kept for providing loan to the DLS customers for replacing their batteries. A sum of Rs 102 850 was collected as maintenance charges, which has been spent, leaving a balance of about Rs 22 000.

The experience shows that the maintenance and management requirements for DLS would be Rs 20 a month for each system. At this rate, a total of Rs 185 600 would be spent on these expenses. If Rs 40 out of the total monthly collection of Rs 60 was contributed towards the revolving fund, an amount of Rs 371 200 would be generated in the remaining 32 months of the project. With 17.5% of the total Rs 1 636 727 that the project would generate as revolving fund, 80 new customers can be partially financed under a similar scheme.

3 *Capacity-building and institutional development*

The study recommends setting up of a shop-cum-repair centre at Rupayan to service both old and new DLS customers in order to enhance the effectiveness of the supply and by way of after sales service infrastructure.

Further, to enhance the skills of technicians, a refresher training programme as well as an advanced training programme on system design and repair and servicing of electronic components such as charge controllers and inverters is suggested.

Finally, in order to address the problem of high turnover of its skilled staff, the study recommends skill acknowledgement and professional development programmes such as train-the-trainer both within and outside country. An option for technicians to work on turn-key contracts rather than on salary basis might also address the issue.

4 *Prospects for new initiatives*

Finally, the study recommends two new initiatives in the region, which are as follows.

- setting up of a 25-kWp decentralized power plant for supply of AC electricity. This initiative supplements the efforts of the local government in expanding a popular programme, which has been shown socio-economically and environmentally beneficial
- Solar lantern charging-cum-renting shops. Five solar lantern charging-cum-renting shops should be set up in each village, with each shop owning a unit to charge 10 lanterns. Initially, ten villages can be identified as beneficiary villages in which these shops can be set up. Charged lanterns can be rented out in the evening for household- and village-level functions.

The study discuses the rationale, system specifications, financing and operational details, and socio-economic and environmental benefits of both the above initiatives. It also recommends the use of a mix of crystalline and thin-film technologies for SPV modules in order to provide an opportunity to evaluate the techno-comercial advantage of the latter in Indian market

Further, an option has been worked out where existing business entities are involved as partners in the intervention to address the long-term sustenance of the same.

TERMS OF REFERENCE

Introduction

As a sector, energy development has both direct and indirect implications on urban and rural poverty. These impacts vary depending on the energy activity. Investments in traditional energy projects such as the construction of a power plant lead to direct impacts in terms of employment generation leading to increased incomes, which improves the quality of life through access to services such as health, education and housing. This leads to other economic impacts such as increased productivity and diversification, and social impacts such as time savings, human and social capital development and gender impacts.

II. Methodology

The methodology will use a combination of quantitative and qualitative approaches. Appropriate econometric methods need be used to understand variables such as energy consumption patterns and poverty reduction impacts Where variables are simultaneously determined, more structured models need to be used. Poverty variables should be consistent with ADB's broad definition of the subject. It will not only reflect income variables, but broader indicators such as access to key services, opportunities for self-employment, and availability of infrastructure Taking note that different direct and indirect energy activities have unique impacts on the urban and rural poor, a impact matrix need to be developed

For example, investments in traditional energy projects contribute to employment generation that leads to increased incomes. The increased income would improve the quality of life through access to services such as health, education and housing. These would lead to many other economic and social impacts such as increased productivity, time saving, better education, health and gender impacts If energy projects designed properly and target the poor correctly, then such benefits can be harnessed. Otherwise the poor can be victimized in several ways—for instance. displacement prior to, and affected by environmental pollution after construction. However, such impacts can be understood only through a systematic approach to poverty reduction impact assessment.

Direct contribution of energy projects to ADB's poverty reduction strategy has seldom been acknowledged mainly because of lack of a systematic approach to assess such impacts. Investments in traditional energy projects such as the construction of a power plant lead to direct impacts in terms of employment generation leading to increased incomes that would improve the quality of life through access to services such as health, education and housing. This would also lead to other economic impacts such as increased productivity and diversification, and social impacts such as time saving, human and social capital development and gender impacts. Impacts differ in the urban and rural sectors, with a commonly held perception that the impacts are more in the rural areas.

In rural areas, there is a primary dependence on biomass and other energy sources on the lower rungs of the energy ladder. Moving to the higher rungs of the energy ladder, such as the use of electricity and gas, is often difficult. The use of low quality fuel creates indoor pollution; this causes poor health particularly among women and children who spend more time indoors. Consequently, dependence on biomass has adverse environmental and health effects.

Biomass and fuelwood collection affects forests and natural resources, as watersheds are degraded and agricultural productivity can be affected leading to lower incomes for those dependent on agriculture. This in turn would increase the need for natural resource extractive practices that further damage the environment. The potential approach to reducing poverty in the rural areas through energy projects is very different In the rural areas, there is a potential for core-poverty reduction energy activities.

Indirect impacts, which often exceed the direct poverty reduction impacts, are more relevant in the urban sector than in the rural sector. These impacts, though larger in scope, are more difficult to understand in terms of linkages between expanded energy provision and reduced poverty. It can also be noted that the provision of energy will have indirect impacts on poverty reduction via the other sectors that use energy. Investments in the energy sector may have little effects on poverty if these do not have implications on the activities of other sectors such as transport, industry, communications, etc. The indirect impacts of energy projects on poverty reduction should consider other issues such as energy production and distribution, employment generation, capital and product markets, energy efficiency and environmental impacts of energy projects. The specific terms of reference for the study is given below

This study will make a contribution to the understanding of the impacts of IEEN projects in poverty reduction. A framework, with checklists and guidelines, for the design of projects and analyzing their poverty reduction impacts will be developed for ADB staff. Both direct and indirect poverty reduction impacts will be identified and procedures for that will be recommended. Newly revised Appendixes 25 and 26 of the ADB's Guidelines for the Economic Analysis of Projects and Staff Instructions on project classification will be extensively used in developing the recommended approaches.

III. Terms of Reference

(i) Conduct a review of literature on the relationship between energy development and poverty reduction.

(ii) Undertake a review of all guidelines, procedures, approaches and methodologies recommended by ADB for design of poverty reduction projects, in particular the revised Appendixes 25 and 26 of the ADB's *Guidelines for the Economic Analysis of Projects* and Staff Instructions on project classification.

(iii) Examine any possible relationship or pattern between energy use and income levels, both at the macro and household levels.

(iv) Examine the relative magnitude of direct and indirect poverty reduction impacts of energy sector projects. Propose a methodology for identifying such impacts giving some examples

(v) Review Country Assistance Plans relevant to IEEN focussing on the main features which will have poverty reduction impacts. Review the current methodology for assessing the poverty impacts of these projects according to relevant ADB policies and guidelines such as *Poverty Reduction Strategy, Guidelines for the Economic Analysis of Projects,* and *Handbook for the Incorporation of Social Dimensions in Projects.*

(vi) Based on the analysis undertaken, suggest how IEEN activities can make maximum contributions to poverty reduction. The analysis will be by energy activity, classified based on direct or indirect interventions and their impacts on both urban and rural poor

(vii) Propose project components and design elements that can maximize poverty reduction impacts. This should include both new project identification and re-formulation of existing projects. This should be in-line with ADB's key framework elements of pro-poor sustainable economic growth, social development and good governance.

(viii) Design a framework with checklists and guidelines for determining the pro-poor growth, poverty interventions including the core-poverty intervention approaches for energy projects.

(ix) Specify data and resource requirements, particularly the required poverty profiles for the project area. The objective of the framework is to aid project design.

(x) In carrying out the above, field missions will be conducted in the Philippines to agencies in the power sector and agencies dealing with poverty reduction.

(xi) Make recommendations on the appropriate choice of IEEN projects in terms of investment priorities and investment strategies that could reduce poverty.

IV. REPORTING REQUIREMENTS

A clear focus on the analysis of project specific examples and recommendations for maximizing the contribution of energy projects to poverty reduction should be maintained. A draft final report of the study should be submitted within 50 days after commencement. The ADB will prepare comments, after which the final report should be submitted at the end of the contract period.

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